

Metabolic syndrome and insulin resistance: Can they be predicted by clinical indicators in obese prepubertal children?

E.Vlachopapadopoulou¹, I. Dikaiakou¹, V. Petrou¹, E. Anagnostou¹, F. Karachaliou¹, I. Patinioti¹, A. Fotinou², S. Michalacos¹

1. Dept. of Endocrinology-Growth and Development, Children's Hospital P. & A. Kyriakou, Athens, Greece
2. Biochemistry Dept.-Hormones Laboratory, Children's Hospital P. & A. Kyriakou, Athens, Greece

AIM

To evaluate whether anthropometric indices and acanthosis nigricans can be useful markers for early detection of Insulin Resistance and Metabolic Syndrome (MetS) in overweight and obese children

METHODS

Data from 510 prepubertal children (40% boys), 12.9 % overweight and 87.1 % obese with mean age 9.7 ±2.5 years were analyzed. Logistic regression analysis was used to investigate which factors were associated with HOMA-IR >3 and metabolic syndrome.

RESULTS

- **MetS** was found in 12.9% of the children.
- **HOMA-IR >3**, was found in 14.3 % of overweight and 39.8 % of obese children.
- Among children with MetS, 50% had **HOMA-IR >3** and they were all obese.
- The mean Body Mass Index (BMI) was greater in children with HOMA-IR >3 (29.3±3.1 vs. 26.1±3.1, p<0.001) (OR:1.31, 1.20-1.44).
- Also, children with HOMA-IR >3 had greater waist circumference (mean±SD: 94.7±9.6 vs. 85.6±10.4, p<0.001).
- **Acanthosis Nigricans** (OR=2.42, 95% CI: 1.23 – 4.79, p=0.011) and increased % fat (OR=1.14, 95% CI: 1.05 – 1.25, p=0.003) were associated with greater likelihood for HOMA-IR >3.
- **Waist-to-height (WHtR)** was associated with greater odds for HOMA-IR >3 (OR=1.07, 95% CI: 1.02 – 1.18, p=0.013).
- Increased WHtR tended to be associated with the presence of MetS (OR=1.07, 95% CI: 0.99 – 1.16, p=0.100), while for one unit increase in BMI the likelihood for MetS was found to increase about 16% (p=0.001).

CONCLUSION

The severity of obesity as evidenced by BMI, the presence of waist circumference to height ratio higher than 0.5, as well as the presence of acanthosis nigricans are clinical indicators of increased metabolic risk.

Children at increased risk should be followed closely and have a more intense program of healthy diet and increased physical activity.

		N	%
Age(SD)		9.7 (2.5)	
Gender	Males	204	40.0
	Females	306	60.0
BMI (kg/m ²) (SD)		26.1 (4.1)	
BMI (kg/m ²)	Overweight	64	12.9
	Obese	433	87.1
WtH ratio, (SD)		0.61 (0.05)	
% Fat, (SD)		35.9 (5.7)	
HOMA-IR >3	<3	142	60.9
	>3	91	39.1
Metabolic syndrome	0	243	87.1
	1	36	12.9
W. C. (SD)		88.2 (11.0)	
Positive hy for obesity	NO	239	48.4
	YES	255	51.6
Acanthosis nigricans	NO	438	87.4
	YES	63	12.6

	HOMA-IR				OR (95% CI)	P	
	<3		>3				
	N	%	N	%			
BMI (kg/m ²)	26.1 (3.1)		29.3 (3.7)		1.31 (1.20 – 1.44)	<0.001	
BMI (kg/m ²)	overweight	6	85.7	1	14.3	3.97 (0.47 – 33.54)	0.205
	obese	136	60.2	90	39.8		
WtH ratio	0.61 (0.06)		0.63 (0.04)		1.10 (1.02 – 1.18)	0.013	
% fat	35.5 (4.7)		38.8 (0.05)		1.14 (1.05 – 1.25)	0.003	
W. C.	85.6 (10.4)		94.7 (9.6)		1.10 (1.05 – 1.14)	<0.001	
F. Hy of obesity	no	53	54.1	45	45.9	0.58 (0.34 – 1.00)	0.051
	yes	85	66.9	42	33.1		
A. N.	no	120	64.5	66	35.5	2.42 (1.23 – 4.79)	0.011
	yes	18	42.9	24	57.1		
Wt/Ht ratio	<0.5	2	66.7	1	33.3	1.62 (0.14 – 18.27)	0.698
	>0.5	73	55.3	59	44.7		

	METABOLIC SYNDROME				OR (95% CI)	P	
	NO		YES				
	N	%	N	%			
BMI (kg/m ²)	26,1 (3.0)		28,4 (3.9)		1.16 (1.06 – 1.27)	0.001	
BMI (kg/m ²)	overweight	17	100.0	0	0,0	-	
	obese	226	86.3	36	13.7		
Wt/Ht ratio	0.61 (0.05)		0.63 (0.05)		1.07 (0.99 – 1.16)	0.100	
% Fat	35,8 (5.6)		36,7 (3.6)		1.03 (0.95 – 1.21)	0.462	
W. C.	87,5 (10.1)		91,89 (10.2)		1.05 (1.00 – 1.09)	0.030	
Family hy of obesity	no	108	87.1	16	12.9	1.06 (0.53 – 2.5)	0.865
	yes	127	86.4	20	13.6		
A. N.	no	206	88.4	27	11.6	1.91 (0.80 – 4.56)	0.147
	yes	32	80.0	8	20.0		
Wt/ Ht ratio	<0.5	2	66.7	1	33.3	0.49 (0.04 – 5.60)	0.568
	>0.5	130	80.2	32	19.8		

