

Clinical and Laboratory Differences between Metabolically Healthy and Unhealthy Obese Children



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Introduction: Some obese children are metabolically healthy obese (MHO), while some are metabolically unhealthy obese (MUO) having dyslipidemia and/or insulin resistance which increase mortality and morbidity related to cardiovascular diseases during adulthood. This study is designed to assess factors affecting metabolic condition in obesity and compare clinical and laboratory findings between MHO and MUO children.

Materials and Methods: In total 1085 obese children and adolescent with age and sex matched body mass index (BMI) above 95 percentile were included in the study. Cases without dyslipidemia, insulin resistance, hepatosteatosis and hypertension were considered as MHO. Dyslipidemia was defined as total cholesterol >200 mg/dl, triglycerides >150 mg/dl, LDL >130 mg/dl or HDL >40 mg/dl. Insulin resistance was evaluated using HOMA-IR index. HOMA levels over 2,5 for prepubertal subjects and over 4 for pubertal subjects were accepted as insulin resistance. Obesity duration, physical activity, eating habits, screen time, parental obesity, serum levels of TSH, free T4, ALT, AST and hepatosteatosis in ultrasonography were also assessed retrospectively. Physical activity status was determined as follows; regular activity less than 150 minutes/week as sedantary, more than 150 minutes/week up to 1 hour/day as moderate and more than 1 hour/day as active. Junk-food frequency less than once a week was assessed as rarely; more than once a week but not everyday was assessed as moderate.

Results: Subjects included in the study were aged between 6-18 years (mean 11,1±2,9 years), 57,6% were female and 59,7% were pubertal. Six hundred forty two (59,2%) cases were MUO. Older age, male gender and higher BMI SD was associated with being MUO. In MUO group serum free T4 levels were lower; TSH were higher (Table 1). Meanwhile active life style was related with being MHO in both prepubertal and pubertal group, rare/non consumption of junk-food were predictive for good metabolic condition only in prepubertal obese cases (Table 2)

Conclusion: Active life style and restriction of junk-food consumption are the major parameters to prevent metabolic disorders in obesity and precautions should be taken from the early childhood since its get harder to stay metabolically healthy after puberty.

Table 1. Demographic features and thyroid functions of the patients and differences between MHO and MUO groups

	Overall	MHO	MUO	p
n (%)	1085 (100,0)	443 (40,8)	642 (59,2)	
Age(year)	11,1±2,9	10,9±2,9	11,3±2,8	0,04
Gender (F/M)	625/460	(280/163)	(345/297)	0,002
Obesity Duration (year)	5,0±3,5	4,7±3,5	5,1±3,4	NS
BMI (SDS)	2,4±0,6	2,3±0,5	2,5±0,6	<0,001
Puberty (Prep./Pubertal)(%)	40,3/59,7	41,5/58,5	39,5/60,4	NS
TSH (mIU/mL)	2,7±1,9	2,5±1,6	2,8±2,0	0,002
sT4 (ng/dl)	0,88±0,1	0,89±0,1	0,87±0,1	0,01

Table 1. Affect of physical activity, eating habits and screen time based on metabolic health and pubertal status

	Overall n(%)	MHO n (%)	Prepubertal MHO/ pubertal MHO n (%)	MUO n (%)	Prepubertal MUO/ pubertal MUO n (%)	p*	p**	p***
Physical Activity	876 (100,0)	363 (100,0)	151 (100,0)/212 (100,0)	513 (100,0)	207 (100,0)/306 (100,0)			
Sedentary	524 (59,8)	200 (55,1)	63 (41,7)/ 137 (64,6)	324 (63,2)	116 (56,0)/ 208(68,0)	0,048	0,028	NS
Moderate	296 (33,8)	139 (38,3)	69 (45,7)/70 (33,0)	157 (30,6)	72 (34,8)/85 (27,8)			
Active	56 (6,4)	24 (6,6)	19 (12,6)/5 (2,4)	32 (6,2)	19 (9,2)/13 (4,2)			
Junkfood frequency	880 (100,0)	364 (100,0)	151 (100,0)/ 213 (100,0)	516 (100,0)	209 (100,0)/307 (100,0)			
Rarely	85 (9,7)	35 (9,6)	15 (9,9)/20 (9,3)	50 (9,7)	25 (12,0)/ 25 (8,1)	NS	0,041	NS
Moderate	241 (27,4)	115 (31,6)	48 (31,8)/67 (31,5)	126 (24,4)	42 (20,1)/84 (27,4)			
Everyday	554 (63,0)	214 (58,8)	88 (58,3)/126 (59,2)	340 (100,0)	142 (67,9)/198 (64,5)			
Screen time	869 (100,0)	361 (100,0)	151 (100,0)/210 (100,0)	508 (58,5)	205 (100,0)/ 303(100,0)			
<2 hours/day	151 (17,4)	62 (17,1)	34 (22,5)/ 28 (13,3)	89 (17,5)	43 (21,0)/ 46 (15,2)	NS	NS	NS
>2 hours/day	718 (82,6)	299 (82,9)	117 (77,5)/ 182 (86,7)	419 (82,5)	162 (79)/ 257 (84,8)			

p* whole group, p** prepubertal, p*** pubertal

