

Determinants and consequences of exaggerated adrenarche in simple obesity



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Introduction & Aims

- ✓ Obese children are at risk for increased DHEAS production, which is assumed to arise from hyperinsulinemia, hyperleptinemia, increased IGF-1 production or chronic low grade inflammation.
- ✓ The consequences of exaggerated adrenarche in boys have not been well studied. Therefore, a retrospective study was set up :
- ✓ To evaluate the prevalence of exaggerated adrenarche in a cohort of obese boys and girls and its correlation with obesity-associated hormonal changes.
- ✓ To evaluate whether obese children with exaggerated adrenarche are at higher risk for a more advanced pubertal maturation, dyslipidemia or central obesity.

Patients & Methods

234 overweight or obese (BMI SDS > 1.3) children, aged between 4 and 18 years, with simple obesity, starting a weight loss program at the UZ Brussel in 2013 and 2014, were studied retrospectively.

Standard anthropometric measurements including 4 site skinfolds thickness measurements and pubertal staging
Body composition by BIA (Bodystat 1500)
DHEAS, fasting insulin, IGF1, leptin by automated immunoassay and fibrinogen and lipid levels by standard laboratory methods)
Logarithms of all hormones were standardized for age using residuals of a simple regression analysis (res).
Statistical analysis : Spearman Rank, Pearson correlation test, Mann-Whitney test
Definitions : Exaggerated adrenarche : DHEAS > 2.4 mg/L

Results

	Boys (n = 99)	Girls (n = 135)	P value
Age (years)	9.8 (4-17.3)	9.8 (4.6-16.6)	0.818
Birth weight (SDS)	-0.08 (-3.04-3.27)	-0.11 (-.84-3.43)	0.653
Height (SDS)	0.79 (-1.63-3.99)	0.78 (-2.95-3.22)	0.679
BMI (SDS)	2.41 (1.44-3.68)	2.38 (1.40-5.72)	0.626
Waist (SDS)	2.24 (1.09-3.91)	2.24 (0.44-5.54)	0.942
Body fat BIA (%)	34 (18-58)	36 (16-69)	0.062
4 Skinfolds (mm)	101 (47-219)	105 (26-212)	0.586
Insulin (pmol/l)	105(20-496)	124(37-461)	0.126
IGF1 (µg/l)	191(88-972)	250 (85-677)	<0.0005
Leptin (µg/l)	25 (6.4-99)	33 (8.3-145)	<0.0005
Fibrinogen (mg/dl)	294 (123-524)	325 (171-514)	0.069
HDL chol. (mg/dl)	46 (22-76)	42 (17-82)	0.049
Triglycer. (mg/dl)	88 (36-133)	87 (41-356)	0.282

DHEAS (mg/L)/log DHEASres	Rho value	P value	R value	P value
Age	0.706	<0.0005		
Birth weight SDS	-0.192	0.005	-0.221	<0.0005
BMI SDS	-0.042	0.523	0.110	0.094
Waist SDS	-0.026	0.703	0.221	0.001
Body fat %	-0.137	0.053	0.040	0.571
4 Skinfolds	0.390	<0.0005	0.176	0.011
Insulin / Log insulin res	0.501	<0.0005	0.262	<0.0005
IGF1 / Log IGF1 res	0.442	<0.0005	0.033	0.619
Leptin / Log Leptin res	0.403	<0.0005	0.163	0.013
Fibrinogen /Logfibr.res	0.181	0.007	-0.128	0.056

Patient characteristics (median/ range)

	Children with DHEAS < 2.4 mg/L N = 211	Children with DHEAS > 2.4 mg/L N = 23 (14 M)	P value
Age (years)	9.4 (4-16.6)	14.0 (7.7-17.3)	<0.0005
Birthweight(SDS)	0.03 (-3.04-3.43)	-0.33 (-2.34-1.76)	0.231
Height (SDS)	0.79 (-2.95-3.99)	0.62 (-1.85-3.99)	0.305
BMI (SDS)	2.38 (1.40-5.72)	2.48 (2.03-3.55)	0.069
Waist (SDS)	2.24 (0.44-5.54)	2.30 (1.41-2.94)	0.631
Body fat BIA (%)	35 (16-69)	35 (18-53)	0.682
4 Skinfolds(mm)	100 (26-207)	131 (82-219)	<0.005
Insulin (pmol/l)	115 (20-495)	177 (62-413)	<0.0005
IGF1 (µg/l)	211 (85-972)	367(107-677)	<0.0005
Leptin (µg/L)	29.7 (6.4-99.2)	38.7 (7.0-144.8)	0.056
Fibrino.(mg/dl)	304 (123-514)	355 (197-524)	0.056
HDLchol.(mg/dl)	44 (17-82)	41 (27-72)	0.050
Triglycer.(mg/dl)	84 (36-356)	95 (55-156)	0.716

Comparison between children with and without exaggerated adrenarche

Correlates of DHEAS /logDHEAS res

	Children > 10 yrs DHEAS < 2.4mg/L N = 90	Children > 10 yrs DHEAS > 2.4 mg/L N = 20	P value
Gender (M/F) (n)	36/54	11/9	0.164
Genital St (1-5)(n)	15/12/7/0/2	1/2/1/3/4	0.001
Age (years)	12.1(10-16)	14.2(10.2-17.4)	<0.0005
Birthweight (SDS)	-0.10 (-3.04-3.43)	-0.68 (-2.34-1.30)	0.156
Height (SDS)	0.60 (-1.94-3.22)	0.61 (-1.85-3.99)	0.535
BMI (SDS)	2.29 (1.46-5.72)	2.46 (2.03-3.55)	0.016
Waist (SDS)	2.10 (0.93-5.54)	2.28 (1.41-2.94)	0.168
Body fat BIA (%)	33 (18-60)	35 (18-53)	0.299
4 Skinfolds (mm)	112 (26-199)	177 (62-413)	0.004
Insulin (pmol/l)	147 (53-461)	177 (62-413)	0.185
IGF1 (µg/l)	291 (88-972)	370 (107-677)	0.141
Leptin (µg/L)	38 (10-99)	37 (7-144)	1.000
Fibrinog. (mg/dl)	327 (196-485)	351 (197-524)	0.386
HDL chol. (mg/dl)	43 (19-61)	40 (27-72)	0.051
Triglycer. (mg/dl)	106 (36-342)	89 (55-156)	0.196

Comparison between children > 10 years with and without exaggerated adrenarche

Conclusions

- ✓ Exaggerated adrenarche is observed in 10 % of obese children and adolescents
- ✓ Exaggerated adrenarche appears to be mainly driven by compensatory hyperinsulinemia
- ✓ Exaggerated adrenarche is associated with lower HDL cholesterol levels and a more advanced genital development in obese adolescents

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No conflicts of interest to declare