Gut hormones secretion across clusters of Metabolic Syndrome in obese prepubertal children

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BACKGROUND

Metabolic Syndrome (MS) represent a common dysmetabolic state in obese children and adolescents. Although data in youth show a role of gut hormones in the risk of developing MS, no data are available during the prepubertal age, especially across clusters of MS.

AIMS OF THE STUDY

- ❖ to evaluate components of the MS in prepubertal obese children compared to controls
- ❖ to characterize changes in GLP-1, Ghrelin and Obestatin concentrations in all obese subects divided according to the clusters of MS.

MATERIALS AND METHODS

- ❖ 90 obese prepubertal children (42M/48F) compared to 30 healthy prepubertal age- and gender matched peers (17M/13F)
- ❖ All components of MS were characterized in all subjects and obese children **were divided into three groups according to the number of components of MS:**
  - group 1: 30 obese without components of MS;
  - group 2: 30 obese with 1 components of MS;
  - group 3: 30 obese with 2 or more components of MS.

- ❖Anthropometric measurements were determined;
- ❖Blood pressure: Systolic, SBP and Dyastolic DBP were determined;
- ❖Adiposity indices: BMI, SDS-BMI, Waist Circumference, Hip Circumference;
- ❖Fasting blood samples were collected and insulin, glucose, lipid profile, ALT, AST and **gut hormones including GLP-1 concentration, Ghrelin and Obestatin** were measured

STATISTICAL ANALYSIS

- ❖ Data are presented as mean ± SD
- ❖ Differences across the groups and controls were evaluated with:
  - Kruskal – Wallis test
  - Sex distribution: Chi Square test
- ❖ Differences among groups: Mann – Whitney test
- ❖ P values < 0.05 were considered statistically significant

GENERAL CHARACTERISTICS OF THE STUDY POPULATION

	Controls	Group 1	Group 2	Group 3	P* for trend	Post - hoc
Sex	17 / 13	14 / 16	13 / 17	15 / 15	0.24°	
Age	9.4 ± 1.8	9.1 ± 1.4	8.5 ± 1.8	8.5 ± 1.6	0.08	
Anthropometric measurements						
Weight (kg)	31.3 ± 8.3	50.5 ± 11.6	53.9 ± 12.2	55.2 ± 15	<0.001	† ‡ ≠
Height (cm)	131.7 ± 11.6	138.2 ± 8.6	136.5 ± 9.3	137.5 ± 12.2	0.19	
BMI (kg/m²)	19.0 ± 3.8	26.0 ± 2.4	27.1 ± 2.4	27.1 ± 3.6	<0.001	† ‡ ≠
BMI – SDS	-0.17 ± 0.96	2.01 ± 0.36	2.33 ± 0.22	2.34 ± 0.3	<0.001	† ‡ ≠ ! Δ
WC (cm)	62.5 ± 5.7	75.0 ± 5.1	83.3 ± 8.0	86.5 ± 10.8	<0.001	† ‡ ≠ ! Δ
Pressure measurements and liver function indexes						
HR (bpm)	79 ± 8	84 ± 10	84 ± 10	86 ± 9	0.14	
SBP (mmHg)	104 ± 9	112 ± 10	113 ± 11	110 ± 13	0.05	† ‡
DBP (mmHg)	57 ± 5	67 ± 10	68 ± 10	64 ± 10	< 0.001	† ‡ ≠
GOT (U/l)	32 ± 11	36 ± 11	31 ± 7	31 ± 10	0.61	
GPT (U/l)	30 ± 11	38 ± 27	42 ± 17	36 ± 19	0.12	
Lipid profile						
Cholesterol (mg/dl)	160 ± 28	174 ± 24	169 ± 37	181 ± 42	0.21	
HDL (mg/dl)	60 ± 15	51 ± 5	50 ± 8	41 ± 7	<0.001	† ‡ ≠ Δ α
Trygliceride (mg/dl)	66 ± 19	87 ± 27	109 ± 42	129 ± 61	<0.001	† ‡ ≠ ! Δ
Parameters of glucose metabolism						
Glycemia (mg/dl)	79 ± 9	88 ± 9	91 ± 11	92 ± 9	<0.001	† ‡ ≠
Insulin (mU/l)	7.07 ± 3.55	13.06 ± 5.43	19.50 ± 17.86	17.32 ± 10.28	<0.001	† ‡ ≠
HOMA – IR	1.51 ± 0.78	2.67 ± 1.26	3.92 ± 3.93	3.42 ± 1.89	<0.001	† ‡ ≠

* Kruskal – Wallis test
° Chi Square test
† Mann – Whitney test p<0.05 Controls vs Group 1
‡ Mann – Whitney test p<0.05 Controls vs Group 2
≠ Mann – Whitney test p<0.05 Controls vs Group 3
! Mann – Whitney test p<0.05 Group 1 vs Group 2
Δ Mann – Whitney test p<0.05 Group 1 vs Group 3
α Mann – Whitney test p<0.05 Group 2 vs Group 3

RESULTS

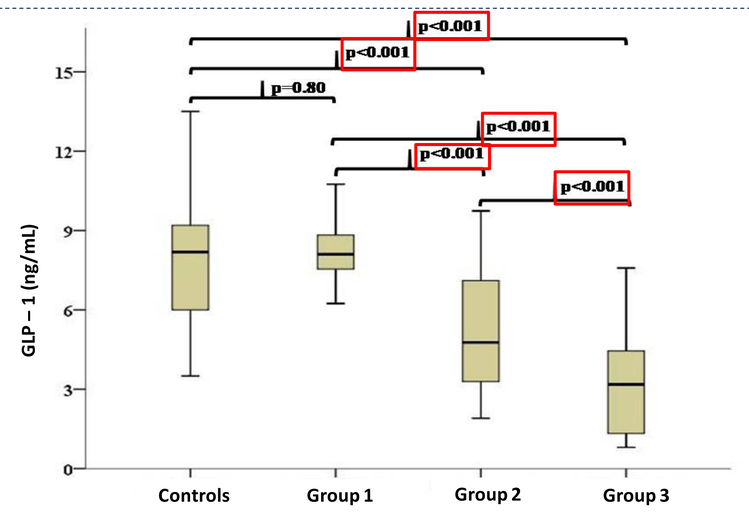

Figure 1. GLP-1 concentrations across clusters of MS

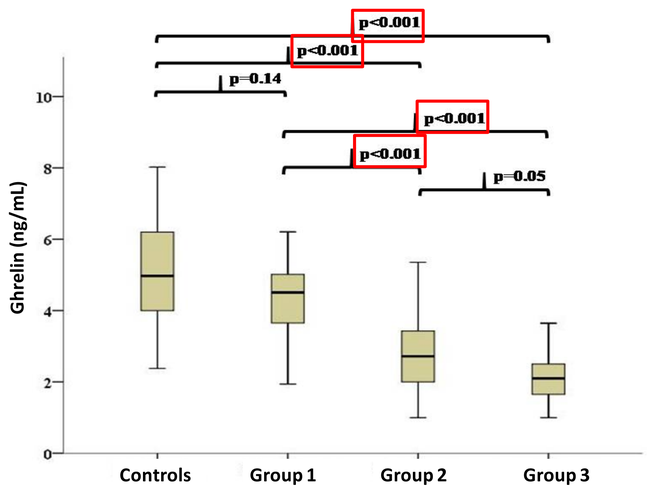

Figure 2. Ghrelin concentrations across clusters of MS

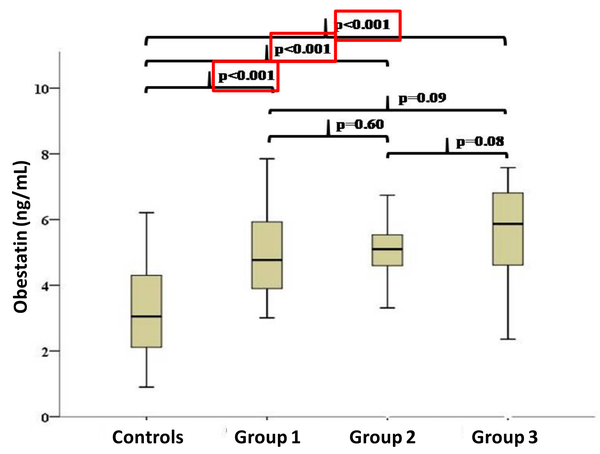

Figure 3. Obestatin concentrations across clusters of MS

CONCLUSIONS

Components of the MS and gut hormones (GLP-1, Ghrelin and Obestatin) concentrations are impaired in obese prepubertal children. The close association between progressive alterations in gut hormones levels and increasing number of components of the MS might suppose a role of these hormones in the determination of metabolic risk.

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58ESPE LB-013

Fat, metabolism and obesity

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Poster presented at: ESPE 2016 VIENNA

PosterSessionOnline.com