Association of Calprotectin with Obesity in Prepubertal Children

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INTRODUCTION

Perturbation of inflammation is critically linked to nutrient metabolic pathways and obesity-associated complications, such as insulin resistance and type 2 diabetes (T2DM). The S100 family of proteins, including S100A8/A9 (calprotectin), have been implicated in disease pathogenesis and investigated as potential markers of inflammation. In adults, increased circulating levels of calprotectin have been reported in obesity-related chronic low-grade inflammation.

AIM

The present study aimed to investigate the differences in calprotectin levels in prepubertal children with normal-weight and overweight/obesity and to investigate whether these relationships remained significant after adjustment for possible confounders.

METHOD

1. Inclusions: 59 prepubertal children aged 6-9 years
2. Exclusions: hypothyroidism, Cushing syndrome, Prader-Willi syndrome, and T2DM
3. The subjects were divided into two groups: normal weighted group (BMI <85 Percentile, n=26) and overweight/obese group (BMI ≥85 Percentile, n=33).
4. Calprotectin and IL-6 were measured using Commercial ELISA kit (Buhlmann Laboratories AG, Schonenbuch, Switzerland) and ELISA assay (R&D System, Minneapolis, MN, USA), respectively.
5. Pearson's coefficient of correlation (r) between calprotectin and clinical parameters were calculated. Multiple linear regression analyses was used to evaluate the independent association between calprotectin and obesity.

RESULTS

Table 1. Clinical characteristics of the study population (*n*=59)

	Normal weight n=26	Overweight/obesity n=33	P
Age (years)	7.35 ± 0.45	7.62 ± 0.97	0.163
Height SDS	0.59 ± 0.92	0.86 ± 1.13	0.331
Weight SDS	0.46 ± 0.72	1.99 ± 0.68	<0.001
Waist circumference SDS	0.35 ± 0.72	1.70 ± 0.57	<0.001
BMI SDS	0.22 ± 0.59	2.25 ± 0.77	<0.001
SBP (mmHg)	104.80 ± 8.18	103.62 ± 11.72	0.675
DBP (mmHg)	62.68 ± 7.28	64.31 ± 6.47	0.388
Glucose (mg/dL)	93.88 ± 4.89	95.36 ± 9.83	0.454
Insulin (μU/mL)	4.84 ± 1.91	9.20 ± 5.57	0.053
HOMA-IR	1.09 ± 0.39	2.14 ± 1.30	0.047
T-C (mg/dL)	180.92 ± 35.95	174.97 ± 30.64	0.495
TG (mg/dL)	69.64 ± 27.49	91.15 ± 36.81	0.018
LDL-C (mg/dL)	105.04 ± 34.55	105.18 ± 24.29	0.985
HDL-C (mg/dL)	61.88 ± 7.39	55.24 ± 11.35	0.009

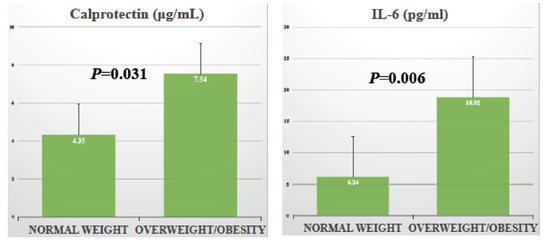
Table 2. Unadjusted correlation between calprotectin, IL-6 and clinical parameters

	Calprotectin (μg/mL)		IL-6 (pg/ml)	
	r	P	r	P
Sex (Male)	0.033	0.803	0.080	0.549
Age (yesrs)	-0.095	0.473	0.149	0.260
Height SDS	0.087	0.511	0.170	0.199
Weight SDS	0.346	0.007	0.331	0.010
Waist circumference SDS	0.270	0.049	0.390	0.004
BMI SDS	0.397	0.002	0.322	0.013
SBP (mmHg)	0.088	0.528	-0.112	0.420
DBP (mmHg)	-0.029	0.837	0.028	0.840
Glucose (mg/dL)	-0.074	0.579	0.244	0.063
Insulin (μU/mL)	0.089	0.640	0.003	0.986
HOMA-IR	0.052	0.787	0.049	0.798
T-C (mg/dL)	0.049	0.714	-0.113	0.395
TG (mg/dL)	0.044	0.745	0.124	0.353
LDL-C (mg/dL)	0.001	0.998	-0.057	0.673
HDL-C (mg/dL)	0.126	0.346	-0.083	0.534
IL-6 (pg/ml)	0.300	0.021	-	-
Calprotectin (μg/mL)	-	-	0.300	0.021

Table 3. Multiple linear regression analyses between calprotectin, IL-6 and clinical parameters after adjustment for age and sex

	Calprotectin			IL-6		
	β	SE	P	β	SE	P
BMI SDS	0.416	0.024	0.001	0.356	0.025	0.007
SBP (mmHg)	0.071	0.221	0.610	0.104	0.236	0.485
DBP (mmHg)	-0.303	0.154	0.832	-0.045	0.165	0.768
Glucose (mg/dL)	-0.090	0.170	0.492	-0.186	0.172	0.168
Insulin (μU/mL)	0.112	0.124	0.567	0.132	0.132	0.525
HOMA-IR	0.100	0.029	0.604	0.105	0.031	0.608
T-C (mg/dL)	0.061	0.718	0.453	0.115	0.754	0.420
TG (mg/dL)	0.067	0.747	0.621	0.037	0.791	0.796
LDL-C (mg/dL)	0.025	0.622	0.850	0.058	0.658	0.685
HDL-C (mg/dL)	0.097	0.204	0.431	0.138	0.215	0.290

Figure 1. Calprotectin and IL-6 levels according to obesity



CONCLUSIONS

•Our results showed that the calprotectin was independently associated with obesity after adjustment for age, sex, and IL-6.

•Our results confirm a potential utility of calprotectin as a marker of obesity-associated chronic low-grade inflammation in children.

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