High Molecular Weight Adiponectin in Children With Critical Illness

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Background

Adipose tissue has recently been recognized to have dynamic endocrine and cytokine functions in critical illness. Adiponectin, a cell signaling protein secreted from adipose tissue, is a modulator of metabolism, inflammation, and vascular permeability in critical illness, and therefore could potentially predict outcomes.

Objective

This study was performed to investigate the relationship of plasma high molecular weight (HMW) adiponectin with plasma interleukin-6 (IL-6) and clinical outcomes in children with critical illness and hyperglycemia.

Methods

Population: Children age 2-18 years with hyperglycemia and concurrent heart and/or lung failure were enrolled in a randomized control trial of tight glycemic control utilizing titrated insulin infusions (n=192). Plasma HMW adiponectin was assayed using commercially available ELISA kits from plasma obtained upon randomization prior to starting insulin administration. HMW adiponectin levels were log transformed due to non-normal distribution. BMI-Z scores were calculated using CDC formulas.

Statistical Analysis: Pearson correlation was used for correlation with baseline demographics and inflammatory markers. Adiponectin levels between survivors and non-survivors were compared using t-test and logistic regression to adjust for severity of illness and BMI-Z scores.

Results

Demographics and ICU Characteristics

Variable	n = 192
Age, yr	9 ± 5
Sex, males (%)	94 (49)
BMI, kg/m^2	19 ± 5
ICU LOS, days	12 ± 10
Max PELOD Score	15 ± 10
PRISM Score	12 ± 9
Ventilator free days	17 ± 10
90 Day Mortality, n (%)	19 (10)

Table 1: Data presented as mean ± SD or count (percentage)

Demographics and ICU characteristics are presented in **Table 1**. A mortality rate of 10% was observed in this patient cohort. Age, weight, and height were negative correlated with HMW adiponectin (**Table 2**).

HMW Adiponectin was Negatively Correlated with Age & Anthropometric Measures

	HMW Adiponectin Rho value	*p*-value
Age	-0.2	<0.01
Weight	-0.3	<0.001
Height	-0.33	<0.001

Table 2: P-values presented as Spearman Correlation Coefficient

Higher HMW adiponectin was correlated with an increase in IL-6 levels from day 0 to day 4 (rho= 0.17; *p*=0.02).

HMW adiponectin was not significantly associated with alternate markers of inflammation including plasminogen activator inhibitor, IL-4, IL-6, IL-8, IL-10, thrombomodulin, iCAM, TNF-alpha, or C-reactive protein; p>0.05).

After adjustment for BMI z-score and pediatric risk of mortality (PRISM) score, higher log-transformed HMW adiponectin levels on Day 0 were significantly associated with increased odds of mortality (**Figure 1**).

Higher HMW Adiponectin was Associated with Increased Mortality

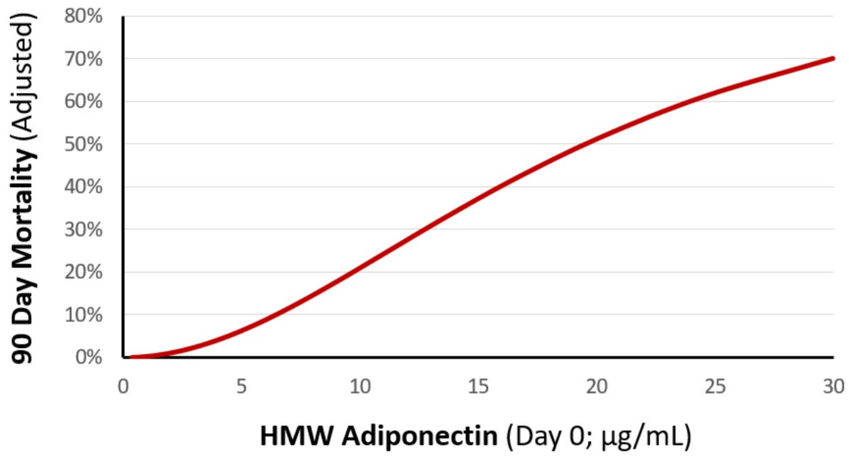

Figure 1: Multivariate analysis identified higher log-transformed Day 0 HMW adiponectin to be associated with increased odds of mortality (OR= 2.0 [CI: 1.03, 3.8]; p=0.04).

Conclusions

To our knowledge, these findings are the first to identify the relationship between high molecular weight adiponectin, inflammation, and mortality in children with critical illness.

HMW adiponectin was associated with a rise in IL-6 and mortality in children with heart and/or lung failure and hyperglycemia, suggesting a role for HMW adiponectin in the pathophysiology of adverse clinical outcomes in this patient population. These findings warrant further investigation as a potential prognostic indicator or therapeutic agent.

Acknowledgements and References

Research was supported by the UCLA Children's Discovery and Innovation Institute (CDI) Fellows Research Support Award

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