World Academy of Science, Engineering and Technology
International Journal of Medical and Health Sciences
Vol:12, No:05, 2018

The Cooperation among Insulin, Cortisol and Thyroid Hormones in Morbid Obese Children and Metabolic Syndrome

Authors : Orkide Donma, Mustafa M. Donma

Abstract : Obesity, a disease associated with a low-grade inflammation, is a risk factor for the development of metabolic syndrome (MetS). So far, MetS risk factors such as parameters related to glucose and lipid metabolisms as well as blood pressure were considered for the evaluation of this disease. There are still some ambiguities related to the characteristic features of MetS observed particularly in pediatric population. Hormonal imbalance is also important, and quite a lot information exists about the behaviour of some hormones in adults. However, the hormonal profiles in pediatric metabolism have not been cleared yet. The aim of this study is to investigate the profiles of cortisol, insulin, and thyroid hormones in children with MetS. The study population was composed of morbid obese (MO) children without (Group 1) and with (Group 2) MetS components. WHO BMI-for age and sex percentiles were used for the classification of obesity. The values above 99 percentile were defined as morbid obesity. Components of MetS (central obesity, glucose intolerance, high blood pressure, high triacylglycerol levels, low levels of high density lipoprotein cholesterol) were determined. Anthropometric measurements were performed. Ratios as well as obesity indices were calculated. Insulin, cortisol, thyroid stimulating hormone (TSH), free T₃ and free T₄analyses were performed by electrochemiluminescence immunoassay. Data were evaluated by statistical package for social sciences program. p<0.05 was accepted as the degree for statistical significance. The mean ages±SD values of Group 1 and Group 2 were 9.9±3.1 years and 10.8±3.2 years, respectively. Body mass index (BMI) values were calculated as 27.4±5.9 kg/m² and 30.6±8.1 kg/m², successively. There were no statistically significant differences between the ages and BMI values of the groups. Insulin levels were statistically significantly increased in MetS in comparison with the levels measured in MO children. There was not any difference between MO children and those with MetS in terms of cortisol, T₃, T₄ and TSH. However, T₄ levels were positively correlated with cortisol and negatively correlated with insulin. None of these correlations were observed in MO children. Cortisol levels in both MO as well as MetS group were significantly correlated. Cortisol, insulin, and thyroid hormones are essential for life. Cortisol, called the control system for hormones, orchestrates the performance of other key hormones. It seems to establish a connection between hormone imbalance and inflammation. During an inflammatory state, more cortisol is produced to fight inflammation. High cortisol levels prevent the conversion of the inactive form of the thyroid hormone T₄ into active form T₃. Insulin is reduced due to low thyroid hormone. T₃, which is essential for blood sugar control- requires cortisol levels within the normal range. Positive association of T₄ with cortisol and negative association of it with insulin are the indicators of such a delicate balance among these hormones also in children with MetS.

Keywords : children, cortisol, insulin, metabolic syndrome, thyroid hormones
Conference Title : ICO 2018 : International Conference on Obesity
Conference Location : London, United Kingdom
Conference Dates : May 14-15, 2018