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ORIGINAL ARTICLE

Relationship between plasma adropin levels and body composition and lipid characteristics amongst young adolescents in Taiwan

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Summary Adropin is a 76 amino acid peptide hormone with a molecular weight of 4999.9 Da that may be associated with energy homeostasis, insulin resistance and lipid metabolism in mice and human. There is only a few studies that examine plasma adropin levels and body composition in children. This study is to evaluate the relationship between plasma adropin levels, body composition and lipid variables amongst young adolescents in Taiwan.

We examined 492 adolescents (269 females and 223 males) ranging from 12 to 15 years old, with a mean age of 13.6 years. Body composition was measured using impedance method by Tanita-BC418. Plasma lipid variables were measured using standard methods and plasma adropin levels were measured using the ELISA method.

There was no significant difference in plasma adropin levels between males and females (3.52 vs. 3.58 ng/ml). Plasma adropin levels were negatively correlated with fat free mass ($r = -0.12$, $p < 0.01$). More interestingly, children with higher plasma adropin levels had lower waist-to-hip ratios (WHR) and lower body fat percentage by mass. Furthermore, there is no difference in lipid profiles in high vs. low adropin subjects.

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Plasma adropin levels are not consistency associated with body composition and no association with lipid variables amongst Taiwanese adolescents. The role of adropin in the development of obesity is still not clear, and further studies are need especially for children.

Introduction

The secreted peptide adropin is a 76 amino acid peptide hormone with a molecular weight of 4999.9 Da which is a product of the Energy Homeostasis Associated (Enho) Gene mainly synthesised in the liver and brain. Adropine may be associated with energy homeostasis, glucose and lipid metabolism, and insulin sensitivity in humans [1—4]. More interestingly, recently reviews indicated that plasma adropin may play a certain role in cardiovascular disease and central nervous system disorders [5—7].

Adropin was identified during an investigation on obese insulin resistant mice as a novel factor linking signals of nutrient intake with metabolic homeostasis [3]. The analysis of adropin regulation and action in mouse models suggested that it involved in metabolic homeostasis. A role for adropin in metabolic homeostasis is supported by the observation that therapy using synthetic peptide or transgenic over-expression improves glucose homeostasis, fatty liver, and dyslipidemia amongst those subjects [3]. The presence of adropin in the central nervous system suggests an additional role as a neuropeptide; it is possible that adropin also has autocrine/paracrine roles [6].

In animal studies, the results have been contradicting in determining an association between adropin deficiency and increased in adiposity in mice [8]. However, other study demonstrated that intraperitoneal administration of adropin for 10 days may decrease serum triglyceride, total cholesterol and LDL-C levels in hyperlipidemia rats. It is also with a significant reduction in blood glucose, serum insulin levels and HOMA-IR [9].

Amongst childhood, the roles of adropin levels on childhood obesity and lipid metabolism are inconsistent. One study demonstrated that serum adropin levels were lower in obese children [4]. However, other studies demonstrated there is no association between plasma adropin level, obesity, metabolic syndrome and insulin resistance on normal and obese children [10]. The serum adropin levels were significantly lower in obese adolescent with fatty liver disease when compared to those without fatty liver disease or normal weight controls [11].

The purpose of this study is to evaluate the relationship between plasma adropin levels and body composition amongst adolescents that will further analyse the role of plasma adropin in relation to the development of obesity amongst adolescents.

Materials and methods

Study design and sampling method

The Taitung Children Heart Study was conducted in Taitung County, Taiwan. This area encompasses approximately 3515 km^2 and has a 13—15 year-old student population of 8000. This study was a cross-sectional study from April 2013 to March 2014 investigating the prevalence and trend of obesity, hypertension, and their relationship with hyperleptinemia and leptin resistance amongst adolescents in Taitung. This study was approved by the Institutional Review Board (IRB) of the Taoyuan General Hospital in Taiwan (TYGH102021). All participants gave informed consent and their anonymities were preserved. This study was limited to adolescents who met the following criteria: (a) ages between 13 to 15, (b) living in Taitung County, and (c) attending a junior high school in Taitung County. Additionally, adolescents enrolled in special education, with visual or hearing impairment, physical disability, or mental retardation were excluded from the study. A α value of 0.05 and

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