건강한 한국성인에서 대사증후군과 아디포넥틴, 인슐린 저항성의 연관성

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문단 제목: 본 연구는 건강한 성인에서 아디포넥틴과 대사증후군 및 그 구성요소와 어떤 연관성을 가지는지 알아보기 위하여 시행되었다.

방법: 본 연구는 분당 지역에 거주하는 30~59세의 과거 병력이 전혀 없는 건강한 남성 256명, 여성 340명을 대상으로 하였다. 아디포넥틴과 대사증후군 및 구성요소의 연관성을 알아보기 위해 로지스틱 회귀분석을 시행하였다.

결과: 연구대상자의 평균 연령은 남성 43.4 ± 8.1, 여성 44.3 ± 8.1이었으며, 대사증후군으로 진단된 남성과 여성 모두에서 아디포넥틴 농도가 유의하게 낮았고 인슐린 저항성은 유의하게 높았다. 남성과 여성 모두에서 대사증후군의 구성요소를 높이기 위해 아디포넥틴 농도가 가장 높은 삼분위수 집단에서 대사증후군의 교차비는 남성 3.56 (95% CI 1.83~6.91), 여성 6.38 (95% CI 2.35~17.3)로 유의하게 높아졌으며 아디포넥틴 농도가 증가함에 따라 대사증후군의 교차비가 감소하는 용량반응관계를 보여주었다 (P for trend < 0.05) 이러한 연관성은 남성의 경우 나이, 체질량지수(BMI), log HOMA-IR score를 보정한 후에도 여전히 유의하였으나, 여성에서는 유의성이 사라졌다.

요약
배경: 저아디포넥틴혈증이 대사증후군의 발생과 유의한 연관성이 있는 연구 결과들이 있는데 한국인에서 건강한 성인을 대상으로 한 연구는 부족하다.

방법: 본 연구는 30~59세의 과거 병력이 전혀 없는 건강한 성인 696명을 대상으로 하였다. 아디포넥틴과 대사증후군 및 구성요소의 연관성을 알아보고자 로지스틱 회귀분석을 시행하였다.

결과: 연구대상자의 평균 연령은 남성 43.4 ± 8.1, 여성 44.3 ± 8.1이었다. 대사증후군으로 진단된 남성과 여성 모두에서 아디포넥틴 농도가 유의하게 높았고 인슐린 저항성은 유의하게 높았다. 남성과 여성 모두에서 대사증후군의 구성요소를 높이기 위해 아디포넥틴 농도가 가장 높은 삼분위수 집단에서 대사증후군의 교차비는 남성 3.56 (95% CI 1.83~6.91), 여성 6.38 (95% CI 2.35~17.3)로 유의하게 높아졌으며 아디포넥틴 농도가 증가함에 따라 대사증후군의 교차비가 감소하는 용량반응관계를 보여주었다 (P for trend < 0.05) 이러한 연관성은 남성의 경우 나이, 체질량지수(BMI), log HOMA-IR score를 보정한 후에도 여전히 유의하였으나, 여성에서는 유의성이 사라졌다.

ABSTRACT

Background: Previous studies identified that a low adiponectin level plays a significant role in the development of metabolic syndrome (MetS). The aim of this study was to evaluate the relationship between adiponectin and MetS and its components in apparently healthy Koreans.

Methods: We performed a cross-sectional study in a sample of Koreans aged 30~59 years, including 256 men and 340 women. Study subjects were recruited by advertisement in Bundang and all had unremarkable medical histories. MetS was defined according to the 2009 Joint Interim Statement criteria. Serum adiponectin concentrations were measured by enzyme-linked immunosorbent assay (ELISA).

Results: The mean ages of study subjects were 43.4 ± 8.1 for men and 44.3 ± 8.1 for women. Both men and women with MetS had significantly lower adiponectin levels and significantly higher HOMA-IR scores. The odds ratios (OR) for MetS in men and women with adiponectin levels in the lowest tertile were 3.56 (95% CI 1.83~6.91) and 6.38 (95% CI 2.35~17.3) compared with highest tertial, respectively. There was also a significant linear decrease with increasing tertiles of adiponectin levels in both men and women. This association between adiponectin and MetS was still significant after adjustment for age, BMI, and log HOMA-IR score in men. However, in women, this association disappeared after full adjustment (age, BMI, log HOMA-IR score).

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Introduction

Metabolic syndrome (MetS) is characterized by interrelated risk factors (hypertension, hypertriglyceridemia, low high-density lipoprotein (HDL) cholesterol, and elevated fasting blood glucose) and insulin resistance, which leads to an increased risk for type 2 diabetes and progression of cardiovascular disease. The prevalence of MetS in Korea is approximately 30% and this statistic has attracted attention here because cardiovascular disease and diabetes have been ranked the 3rd and 5th leading causes of mortality, respectively.

Adipose tissue is not only an inert energy storage depot, but also an active organ that secretes various hormones. Serum adiponectin, which is the most abundant adipokine secreted from adipose tissue, regulates lipid metabolism, glucose metabolism, and insulin sensitivity. Adiponectin is regulated by metabolic stress and a number of biological markers, such as catecholamines, glucocorticoids, IL-6, TNF-α, growth hormone, thiazolidinediones, and androgens. Adiponectin is closely related to obesity and metabolic derangements, including insulin resistance. Previous studies suggested a low adiponectin level may play a major role in the development of MetS. There are many reports showing a relationship between a low adiponectin level and insulin resistance; while, other studies found a low adiponectin level is strongly associated with the risk of MetS, independent of insulin resistance. Yet, there are few reports in apparently healthy Korean. Therefore, this study aimed to evaluate the relationship between adiponectin concentration and MetS and its components in apparently healthy Korean.

Materials and Methods

1. Study Subjects

The study subjects were recruited by advertisement in Bundang between June 2009 and October 2010. This study included individuals aged 30~59, who did not have a history of cardiovascular disease, diabetes, hypertension, dyslipidemia, cancer and did not use any medications related with these diseases. A total of 596 apparently healthy subjects (256 men and 340 women) were enrolled. This study was approved by the Institutional Review Board at the Bundang Jesaeng General Hospital and written informed consent was received from each participant.

2. Laboratory measurements

Body weights and heights were measured using an automatic height and weight scale (GL-150; G-Tech International, Korea). Waist circumference was measured to the nearest 0.1 cm at the narrowest point between the lowest rib and the uppermost lateral border of the right iliac crest. Blood pressure was measured using a sphygmomanometer (EW3152; Panasonic, Japan) in the sitting position after a 5-min rest. Venous blood was collected after at least 8 hours of fasting. Triglyceride, HDL-cholesterol, and glucose levels were measured using an enzymatic colorimetric test (GPO-PAP), an enzymatic method, and the HK-G6PD (UV) method, respectively. Insulin levels were measured with an ECLIA (electrochemiluminescence immunoassay). Insulin resistance was assessed with the Homeostatic Model Assessment (HOMA) index using the following formula: fasting insulin (μIU/mL) × fasting plasma glucose (mmol/L) / 22.5. Serum adiponectin concentration was measured by an enzyme-linked immunosorbent assay using a commercially available kit (AdipoGen, Seoul, Korea). The intra- and inter-assay coefficients of variations were 2.9~3.8% and 2.8~5.5%, respectively.

3. Definition of metabolic syndrome

Metabolic syndrome was defined according to the 2009...