



ELSEVIER

Available online at [www.sciencedirect.com](http://www.sciencedirect.com)

SciVerse ScienceDirect

journal homepage: [www.elsevier.com/locate/nmcd](http://www.elsevier.com/locate/nmcd)

Nutrition,  
Metabolism &  
Cardiovascular Diseases



# Inverse association between circulating adiponectin levels and skeletal muscle strength in Japanese men and women

C. Huang<sup>a</sup>, K. Niu<sup>b</sup>, H. Momma<sup>c</sup>, Y. Kobayashi<sup>a</sup>, L. Guan<sup>a</sup>,  
R. Nagatomi<sup>a,c,\*</sup>

<sup>a</sup>Department of Medicine and Science in Sports and Exercise, Tohoku University Graduate School of Medicine, 2-1 Seiryomachi, Aoba-ku, Sendai 980-8575, Japan

<sup>b</sup>Department of Epidemiology, School of Public Health, Tianjin Medical University, 22 Qixiangtai Road, Heping District, 300070 Tianjin, People's Republic of China

<sup>c</sup>Division of Biomedical Engineering for Health and Welfare, Tohoku University Graduate School of Biomedical Engineering, 2-1 Seiryomachi, Aoba-ku, Sendai 980-8575, Japan

Received 11 October 2012; received in revised form 19 March 2013; accepted 19 March 2013  
Available online 17 June 2013

## KEYWORDS

Adiponectin;  
Grip strength;  
Leg extension power;  
Adults

**Abstract** *Background and aims:* Increased levels of circulating adiponectin in the elderly cause a negative impact on physical function and health status, which suggests that circulating adiponectin may be related to skeletal muscle function. However, data on the relationship between circulating adiponectin levels and skeletal muscle function is limited. Our objective was to investigate the association between serum adiponectin levels and muscle strength in adults. *Methods and results:* This cross-sectional study is a part of the Oroshisho Study of adult employees in Japan from 2008 to 2011. In our study, we used data gathered in 2008–2010 that had included serum adiponectin measurements ( $n = 1378$ ; age, 19–83 years). From this population, 1259 subjects were evaluated for grip strength (949 men, 310 women), and 965 subjects were evaluated for leg extension power (716 men, 249 women). Multivariate linear regression analyses showed that adiponectin was associated significantly and negatively with both grip strength ( $\beta$  and standard error [SE]: men,  $-0.09$  [0.01],  $p = 0.010$ ; women,  $-0.20$  [0.03], kg,  $p = 0.002$ ) and leg extension power (men,  $-0.09$  [0.02],  $p = 0.014$ ; women,  $-0.14$  [0.07], W,  $p = 0.032$ ) after adjusting for age, physical activity, nutrient intake, depressive symptoms, metabolic syndrome, C-reactive protein, body mass index, and other lifestyle-related potential confounders.

*Abbreviations:* ANCOVA, analysis of covariance; BMI, body mass index; CVD, cardiovascular disease; HDL-C, high-density lipoprotein-cholesterol; hs-CRP, high-sensitivity C-reactive protein; MET, metabolic equivalent; PA, physical activity; SE, standard error.

\* Corresponding author. Division of Biomedical Engineering for Health and Welfare, Tohoku University Graduate School of Biomedical Engineering, 2-1 Seiryomachi, Aoba-ku, Sendai 980-8575, Japan. Tel./fax: +81 22 717 8586.

E-mail address: [nagatomi@med.tohoku.ac.jp](mailto:nagatomi@med.tohoku.ac.jp) (R. Nagatomi).

**Conclusion:** This population-based cross-sectional study indicates an inverse association between serum adiponectin levels and muscle strength in adults. Further studies are necessary to confirm this association and to clarify causality.

© 2013 Elsevier B.V. All rights reserved.

## Introduction

Adiponectin, an adipocyte hormone produced mainly by the adipose tissue that regulates energy homeostasis, circulates abundantly in the blood [1]. Adiponectin differs from other adipokines because it is reduced in obesity and increases energy expenditure [1]; thus, adiponectin may induce weight loss by acting on the brain directly [2]. In addition, a human-based nested case–control study indicated that high levels of circulating adiponectin in adult men are associated with a lower risk for myocardial infarction, which suggests that adiponectin may be protective against coronary heart disease [3].

However, there is a growing interest in the possibility that high levels of adiponectin may play a paradoxical role in the pathogenesis of cardiovascular disease (CVD) and/or coronary heart disease and CVD-related mortality. Several human-based epidemiologic studies confirmed this hypothesis by demonstrating that high adiponectin levels increase the risk of CVD and mortality among elderly [4–6] and predominantly middle-aged populations [7]. Although the precise mechanisms underlying this relationship are unknown so far, Wannamethee et al. [4,8] hypothesized that adiponectin may accelerate the decline of skeletal muscle function, which has been linked to an increased risk of mortality. This hypothesis was based on two human-based prospective studies, which demonstrated an inverse relationship of circulating adiponectin level with physical function, including muscle function [9,10]. Moreover, muscle strength is an important indicator of muscle function and is related inversely to CVD incidence in adults [11]; further, it is a significant predictor of CVD risk and mortality due to all causes in the elderly [11].

Recently, a significant and independent association between high adiponectin levels and physical disability in the elderly has been observed [9]; Hozawa et al. [10] also reported a positive association between circulating adiponectin and physical disability in 505 Japanese individuals aged 70 years or more. These findings suggest potential involvement between circulating adiponectin and skeletal muscle function; however, little is known about this relationship.

Therefore, in the current study, a cross-sectional study in Japanese adults was designed to investigate the association between sex-specific serum adiponectin levels and skeletal muscle strength, including grip strength and leg extension power.

## Methods

### Study population

A cross-sectional study was performed using data gathered in 2008–2010 from the Oroshisho Study, a longitudinal

study of the lifestyle-related effects on illness and health status in Japanese adult employees working at the Sendai Oroshisho Center in Sendai, Japan, between 2008 and 2011. Details of the Oroshisho Study have been described elsewhere [12].

Current analyses were limited to participants who provided written informed consent for the analysis of their data ( $n = 1619$ ). Of this group, 3 were excluded because they lacked serum adiponectin data, 194 were excluded because they had a history of CVD, renal failure, or the use of anti-hypertensive, lipid-lowering, or anti-diabetic agents, and 44 were excluded due to incomplete data, including information on their physical activity, dietary habits, depressive symptoms, occupation, and education levels. Based on this sample of participants, subjects with data missing for grip strength ( $n = 119$ ) or leg extension power ( $n = 413$ ) were also excluded from these analyses. For grip strength analysis, a total of 1259 individuals (949 men and 310 women) had provided data for all the variables studied. For leg extension power analysis, 965 subjects (716 men and 249 women) were available. All research procedures in the current study were consistent with ethical principles for medical research involving human subjects from the Declaration of Helsinki [13]. The Institutional Review Board of the Tohoku University Graduate School of Medicine approved the protocol for the study.

### Adiponectin and other biochemical analyses

Blood samples were drawn simultaneously from the antecubital veins of patients at rest before breakfast and collected in siliconized vacuum glass tubes until analysis. Serum adiponectin levels were determined by a specific sandwich enzyme-linked immunosorbent assay (Otsuka Pharmaceutical, Tokyo, Japan); the lower limit of detection was 23.4 pg/mL. The detection range of adiponectin was 0.375–12.0 ng/mL, and its intra- and inter-assay coefficients of variation were <10%.

Serum high-sensitivity C-reactive protein (hs-CRP) levels were measured by N-latex CRP-2 (Siemens Healthcare Japan, Tokyo, Japan). Enzymatic methods were used via kits to measure fasting blood glucose (Eurotec, Tokyo, Japan), triglycerides, and high-density lipoprotein-cholesterol levels (Sekisui Medical, Tokyo, Japan).

### Assessment of skeletal muscle strength

Grip strength (measured in kg) using an adjustable Smedley dynamometer (TKK 5401; Takei Scientific Instruments Co., Ltd., Niigata, Japan) on subjects who were maintained in a standing position. The dynamometer was adjusted individually to fit the hand size, and the subjects were encouraged to exert maximal grip effort. Two measurements were

Download English Version:

<https://daneshyari.com/en/article/3001865>

Download Persian Version:

<https://daneshyari.com/article/3001865>

[Daneshyari.com](https://daneshyari.com)