The Effect of Visceral Fat Area and Adipocytokines on Acute Myocardial Infarction: A Case-Control Study in Adult Korean Population

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ABSTRACT

Background: This study aimed to analyze visceral fat area (VFA) and the pattern of secretion of adiponectin, leptin, TNF-α, IL-6, and IL-10. It also studies the effect of VFA and adipocytokines on the risk of Acute myocardial infarction (AMI) in adult Korean population.

Methods: A patient group (PG) consisting of 121 patients, who were hospitalized for AMI from 2008 to 2009, and a control group (CG) consisting of 115 healthy adults, who visited the same hospital for health examination within the same period, were included in this study. Physical measurements were performed and VFA was measured using computed tomography. Lipid, metabolic index, adipocytokine levels were also measured after 12 hours of fasting.

Results: BMI, waist circumference, levels of leptin, TNF-α, and IL-6 were significantly higher in the PG, while adiponectin level was significantly higher in the CG. According to the comparison study analyzed by gender, VFA level was significantly higher in the PG, and IL-10 level was significantly higher in the CG. After adjusting for the conventional risk factors (CRF) of AMI, regression analysis showed that adiponectin and IL-10 levels reduced the risk of AMI; whereas VFA, TNF-α, leptin, and IL-6 increased the same risk.

Conclusion: It is postulated that adipocytokines and VFA...
will act as independent risk factors of AMI regardless of CRF of coronary artery disease.

**Key words:** Myocardial infarction, Visceral fat, Adipocytokines

## Introduction

Mortality of acute myocardial infarction (AMI) is about 30%, and half or more of the mortality occur before the patient’s arrival at the hospital. Although survival rate after hospitalization has improved over the past 20 years, 5~10% of survivors of AMI die in the first year after AMI.1

Inflammatory reaction is known to play a key role in the development of coronary artery disease, although complex causes contribute to the development of coronary artery disease.2,3 However, the cause of inflammatory reaction, and the relation between inflammation and coronary artery disease remain unclear.

So far, adipose tissue has received attention in studies as an inflammatory burden of coronary artery disease, and adipose tissue is known to synthesize and secrete adipocytokines, a pro-inflammatory agent.

The relation between visceral fat as a risk factor and coronary artery disease has become clearer since adipose tissues, particularly visceral fat, as endocrine organs have been known to secrete cytokines which influence various metabolic processes.4,7 Adiponectin is a protein that is expressed specifically in the adipose tissue. It improves insulin sensitivity by promoting oxidation of fatty acid in muscles.8 In addition, it exerts anti-inflammatory effect by inhibiting the expression of adhesion molecule and the secretion of cytokine in macrophage.8 Blood adiponectin level is also known to decrease in the case of AMI.5

Vascular smooth muscle cells are known to have anti-arteriosclerosis effect by inhibiting cell proliferation and migration caused by platelet-derived growth factor.9

Leptin is a hormone secreted by adipocyte, which controls appetite and energy metabolism, and is directly related with body fat volume.10 It has been reported that leptin level is significantly related to insulin resistance after adjustment of BMI.11 Numerous studies have shown that leptin could play an important role in the development of cardiovascular diseases.12,13

Interleukin-6 (IL-6) is a cytokine that is involved in acute phase reaction, immune reaction, and hematopoiesis. Studies have shown that blood IL-6 level increases in proportion to the increase in postprandial blood insulin and glucose level in patients with type II diabetes, particularly in type II diabetes patients with insulin resistance.14-16

IL-10, a cytokine that has strong anti-inflammatory effect, is secreted by macrophages in response to stimulation of infectious agents, and reduces tissue damage caused by the secretion of inflammatory cytokines.18,19 Decrease in IL-10 may be a factor in inducing the rupture of arteriosclerotic thrombotic plaque, and it has been reported that IL-10 level is low in patients with unstable angina.20

The secretion and function of adipocytokines and the imbalance in such secretion and function are believed to be linked to abdominal visceral obesity and cardiovascular disease and is thought to act as independent risk factors of coronary artery disease.

Thus, this study aimed to investigate how much visceral fat area (VFA) and various adipocytokines will act as independent risk factors of AMI regardless of CRF of coronary artery disease.

### Key words:
- Myocardial infarction
- Visceral fat
- Adipocytokines

### Methods

**1. Subjects**

Patients aged 19 and above who were hospitalized after being initially diagnosed with AMI at the Department of Cardiology at two university hospitals, from December 2008 to June 2009, were included in the patient group. Healthy people aged 19 and above who visited the Department of Family Medicine for health examination within the same period, who did not have risk factors for cardiovascular disease, were included in the control group.