

WEIGHT LOSS REDUCES C- REACTIVE PROTEIN AND FIBRINOGEN LEVELS IN OBESE WOMEN

Narges Tajik⁽¹⁾, Seyed Ali Keshavarz⁽²⁾, Mahmoud Djalali⁽²⁾, Hale Sadrzadeh yeganeh⁽³⁾,
Mohammad Reza Eshraghian⁽⁴⁾, Maryam Chamary⁽⁵⁾

Abstract

BACKGROUND: obesity is one of the most important risk factors in chronic diseases, like coronary heart disease and diabetes mellitus. It is believed that elevated levels of C- reactive protein (CRP) and fibrinogen are associated with increased cardiovascular risk. We examined the hypothesis that weight loss would reduce plasma CRP and fibrinogen levels in obese women.

METHODS: Body weight, fasting glucose, insulin, triglyceride, total cholesterol, high- density lipoprotein cholesterol (HDL-C), low- density lipoprotein cholesterol (LDL-C) and acute phase proteins were measured at baseline and after 12 weeks of weight loss regimen in 29 obese women.

RESULTS: Weight, BMI, fasting blood glucose, cholesterol and triglyceride had significant reductions. HDL-C had increased significantly. No significant changes were observed in LDL-C and insulin concentrations. Plasma acute phase proteins levels decreased significantly.

CONCLUSION: Weight loss may represent an important intervention to reduce acute phase protein levels, which may mediate its cardioprotective effects in obese women.

Keywords: Obesity, weight loss, acute phase proteins, cardiovascular disease, women.

ARYA Atherosclerosis Journal 2008, 4(3): 108-111

Date of submission: 25 Jun 2008, *Date of acceptance:* 10 Aug 2008

Introduction

Obesity is the most prevalent nutritional disorder in industrialised countries and a growing problem in the developing world.¹ The exact role and mechanisms by which increased weight, promotes cardiovascular risk are poorly understood, and the extent to which this is reversible with weight loss is not yet clear. Current evidence suggests that the association between obesity and cardiovascular disease can be explained, at least in part, by novel signaling molecules (adipokines) emanating from, or expressed in, adipose tissue, such as interleukin-6, tumor necrosis factor- α and CRP.^{2,3}

Interleukin-6 is a powerful inducer of the several acute phase proteins, such as CRP and fibrinogen, which are potent cardiovascular risk factors.⁴

High serum concentrations of CRP correlate with the presence of subclinical cardiovascular disease and

the risk of acute cardiovascular events, like myocardial infarction (MI) and stroke.^{5,6}

Fibrinogen plays a dual role in atherosclerosis as the major clotting factor in the blood and a pro-inflammatory molecule.⁷

The impact of weight loss on mortality and morbidity, in particular from cardiovascular disease, is still a matter of debate.⁸

Investigating the effect of weight loss on the mentioned inflammatory markers might explain the role of weight reduction in reducing cardiovascular risk factors. The aim of this study was to assess the effect of weight loss on plasma acute phase proteins in Iranian obese women.

Materials and Methods

In a clinical trial, 29 obese woman (BMI ≥ 30 kg/m²) aged 21-48 years underwent a 12-week weight loss

1) Department of Nutrition and Biochemistry, School of Public Health, Tehran University of Medical Sciences, Tehran, Iran.
E-mail: ntjk 55@ yahoo. com

2) Professor, Department of Nutrition and Biochemistry, School of Public Health, Tehran University of Medical Sciences, Tehran, Iran.

3) Instructor, Department of Nutrition and Biochemistry, School of Public Health, Tehran University of Medical Sciences, Tehran, Iran.

4) Associate Professor, Department of Epidemiology and Biostatistics, School of Public Health, Tehran University of Medical Sciences, Tehran, Iran.

5) MS student, Department of Nutrition and Biochemistry, School of Public Health, Tehran University of Medical Sciences, Tehran, Iran.

Corresponding author: *Narges Tajik*

diet, amounting 500-1000 kcal less than energy consumed before involvement and also two scales slim last powder. Weight loss was defined as a reduction of 10% of weight during 12 weeks. All subjects were healthy, nonsmoking and not under treatment for coronary heart disease, diabetes, or dyslipidemia. The other exclusion criteria were pregnancy and lactation. Patients were also evaluated considering other causes of weight loss and excluded if any known cause of weight loss detected. Most subjects were sedentary at baseline and asked to continue their usual physical activity levels throughout the study. All participants gave their written consent to participate in the study.

A general and 24 hours recall questionnaires were completed for each patient. Body weight was recorded while the subjects were wearing light clothing without shoes to the nearest 0.1 kg. Height was measured to the nearest 0.5 cm, and BMI (kg/m²) was calculated. 10 ml venous blood samples were withdrawn from subjects in fasting state at baseline and after 12 weeks. Plasma or serum was isolated and frozen at -70°C until analyzed. Glucose, total cholesterol, HDL-C, LDL-C and triglyceride were measured on a Hitachi 717 auto analyzer (Boehringer Mannheim, Indianapolis, IN) with the use of commercially available enzymatic kits (Pars Azmoon, Tehran, Iran). Fasting insulin was measured with a radioimmunoassay kit (IRMA KIT, France). CRP was measured with a particle – enhanced immunoturbidimetric assay with the use of commercially available enzymatic Kits (Pars Azmoon, Tehran, Iran) and fibrinogen was measured with a claus assay with the use of commercially available enzymatic kits (Mahsa Yaran, Tehran, Iran).

Data are summarized as the means \pm SD in the case of normal distribution. The effect of dietary intervention was tested by student's paired t-test. The level

of significance was set as $P < 0.05$ for all analyses. The analysis was performed using SPSS Version 11.5.

Results

After 12 weeks of restricted diet, the subjects had a mean of 10.3% weight loss. Analysis revealed that the change of weight improved fasting glucose by 8.66 % ($P < 0.05$), cholesterol by 6.49% ($P < 0.05$), and triglycerides by 13.41% ($P < 0.05$). HDL-C had increased significantly ($P < 0.05$). There were no significant changes in LDL-C and insulin concentrations. We also observed statistically significant changes in plasma CRP ($P < 0.05$) and fibrinogen ($P < 0.05$) (Table 1).

Discussion

The results of this study support the idea that a modest weight loss (approximately 10%) can improve fasting blood glucose, lipid profile and plasma acute phase proteins. There is a growing body of evidence that local and perhaps systematic inflammation is involved in the initiation and progression of atherosclerosis.⁹ Therefore measuring inflammatory markers such as CRP and fibrinogen may increase the ability to predict thrombotic events.

Plasma CRP level is a sensitive marker of systemic inflammation that has been related to cardiovascular disease through several plausible pathways.¹⁰ These include the possibility that CRP levels reflect inflammation of coronary vessels related to the formation and severity of the atherogenic plaque or inflammation related to myocardial ischemia or necrosis.¹¹

It has also been suggested that plasma CRP levels reflect the amount and activity of pro-inflammatory cytokines such as tumor necrosis factor α , interleukin-1 and interleukin-6, which are implicated in the process of atherosclerotic plaque formation and acute coronary syndromes.^{12,13}

Table 1. Anthropometric and laboratory variables before and after program

	Before	After	P value
Weight (kg)	89.92 \pm 14.27	80.9 \pm 13.41	0.0001<
BMI (kg/m ²)	35.37 \pm 4.65	32.08 \pm 4.34	0.0001<
FBS (mg/dl)	100.24 \pm 18.25	91.55 \pm 13.43	0.01<
Insulin (mU/L)	8.81 \pm 9.94	6.17 \pm 9.04	NS
Total cholesterol (mg/dl)	193.27 \pm 31.58	180.72 \pm 34.01	0.05<
HDL-C (mg/dl)	38.41 \pm 10.02	40.62 \pm 10.6	0.05<
LDL-C (mg/dl)	117.34 \pm 27.17	110.79 \pm 24.4	NS
Triglyceride (mg/dl)	133.13 \pm 49.85	115.27 \pm 44.27	0.05<
CRP (mg/l)	3.57 \pm 2.34	2.7 \pm 1.44	0.05<
Fibrinogen (mg/dl)	287.86 \pm 22.55	226.93 \pm 16.18	0.0001<

Data are given as the Mean \pm SD, NS: non-significant, BMI: Body mass index FBS: Fasting blood sugar

Several studies suggest that CRP is elevated in obesity.¹⁴⁻¹⁷ In the present study we realized the significant decrease of plasma CRP concentration accompanied by weight loss.

This finding is in agreement with other studies,^{18,19} while some studies have failed to show any significant decrease in CRP concentration after moderate weight loss.

In Bastard et al study, weight loss caused significant changes in some metabolic markers, but CRP changes did not reach statistical significance.²⁰ Lack of statistical significance in CRP levels after weight loss in the study by Bastard et al may have been attributable to the rather short duration of the weight loss and smaller amounts of weight lost (mean of 3 kg fat mass) compared with that of the present study.

Fibrinogen concentration has been shown to be a marker for cardiovascular disease. The mechanism by which it is associated with atherothrombosis could be via its connection with red cell aggregation.

In Fact, fibrinogen is a major determinant of red cell aggregability.²¹ Fibrinogen is increased in obese individuals and can be modulated by life style modification approaches.²² In the present study, there was a significant reduction in the level of fibrinogen compared with baseline level. This finding is in agreement with other studies.^{23,24}

Some studies have failed to show any significant decrease in fibrinogen concentration after moderate weight loss.²⁵

In conclusion, weight loss represents a safe method for down regulating the inflammatory state in obese women.

Acknowledgements

This study was supported by Vice- Chancellery for Research of Tehran University of Medical Sciences. We are thankful to those who donated blood for our study, and we are grateful to the head and staff of the laboratory of the Department of Biochemistry and Nutrition, School of public Health, Tehran University of Medical Sciences for their cooperation.

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