

A 12-week worksite health promotion program reduces cardiovascular risk factors in male workers with the apolipoprotein E2 and apolipoprotein E3 genotypes, but not in apolipoprotein E4 genotype

Sang-Woon Cho^a, Ji-Yeon Kang^a, Yoo-Kyoung Park^{b,c}, Yun-Mi Paek^{a,*}, Tae-In Choi^{a,*}

^aRadiation Health Research Institute, Korea Hydro & Nuclear Power Co., Ltd, Seoul 132-703, South Korea

^bDepartment of Medical Nutrition, Kyung Hee University, Yongin 446-701, South Korea

^cResearch Institute of Clinical Nutrition, Kyung Hee University, Seoul 130-701, South Korea

Received 8 June 2009; revised 30 July 2009; accepted 13 August 2009

Abstract

Worksite health promotion programs focusing on diet and lifestyle modification have been shown to improve health outcomes in workers. The purpose of this study was to investigate whether a 12-week worksite health promotion program shows different response of cardiovascular risk factors in subjects according to apolipoprotein E (Apo E) genotype and obesity level in 141 male Korean industrial workers. We hypothesized that the health changes of a 12-week intervention may not be the same within Apo E genotypes in nonobese and obese subjects. They received 5 face-to-face meetings based on their health profiles. In obese group carrying Apo E3 genotype, body mass index, body fat (%), waist circumference, waist-hip ratio, and systolic blood pressure were decreased, as well as intakes of energy ($P = .000$) and carbohydrate ($P = .005$). High-density lipoprotein cholesterol ($P = .004$) level was improved in individuals with the Apo E2 genotype. These beneficial effects were only observed in individuals with the Apo E2 or Apo E3 genotype. Multiple linear regression revealed that obesity was strongly correlated with waist circumference ($P = .002$), plasma total cholesterol ($P = .037$), and changes in dietary cholesterol intake ($P = .011$) in individuals with the Apo E3 genotype, whereas only changes in dietary fat intake ($P = .044$) was correlated in those with the Apo E4 genotype. Overall, the results of this study suggest that a health promotion program can be a useful method of improving cardiovascular risk factors and dietary intake in industrial workers with certain genotypes only. Therefore, further research is needed to develop a tailored, long-term worksite health promotion program based on genetic background.

© 2009 Elsevier Inc. All rights reserved.

Keywords: Apolipoprotein E; Cardiovascular risk factors; Dietary intakes; Industrial workers; Worksite health promotion
Abbreviations: ANOVA, analysis of variance; Apo E, Apolipoprotein E; BMI, Body mass index; CHD, Coronary heart disease; CVD, Cardiovascular disease; gDNA, genomic DNA; HDL, high-density lipoprotein; LDL, low-density lipoprotein; PCR, polymerase chain reaction; WHR, waist-hip ratio.

1. Introduction

Cardiovascular disease (CVD) is a major cause of morbidity and mortality in the Korean population. In 2008,

CVD including cerebrovascular disease and heart disease was ranked as the second greatest cause of death in Korean men [1]. Elevated plasma levels of total cholesterol, low-density lipoprotein (LDL) cholesterol, and triglycerides and decreased plasma levels of high-density lipoprotein (HDL) cholesterol are associated with an increased risk of coronary heart disease (CHD) [2]. Although these plasma lipid levels are associated with environmental variables

* Corresponding authors. Tel.: +82 2 3499 6651; fax: +82 2 3499 6622.

E-mail addresses: ympaek@khnp.co.kr (Y.-M. Paek),
choimd@khnp.co.kr (T.-I. Choi).

such as diet and lifestyle, genetics also play a significant role in their levels [3].

Apolipoprotein E (Apo E) is recognized as one of the most important genetic determinants of CVD because of its influence on plasma lipid levels [4,5]. Accordingly, the effects of Apo E polymorphism and intervention programs on cardiovascular risk factors have been intensively investigated. Saito et al [6] demonstrated that body weight decreased slightly in individuals with both the Apo E3/3 and Apo E4/3 genotypes after diet therapy, but that this decrease was not significant. Saito et al [6] reported that reduction in body weight was observed in individuals with both the Apo E3/3 and Apo E4/3 genotypes after diet therapy. Kim et al [7] found that after 12-weeks of dietary counseling intervention, favorable changes occurred in weight, body mass index (BMI), waist-hip ratio (WHR), and blood pressure in hyperlipidemic patients with different Apo E genotype. Rantala et al [8] also reported that a low-fat diet led to a greater decrease in systolic blood pressure in Apo E4 (−5.8%, −8.6 mm Hg) individuals than in Apo E3 subjects (−1.0%, −1.3 mm Hg). Previous studies have also shown that the plasma lipid responses of individuals with different Apo E genotype to intervention programs are conflicting. Several studies have suggested that subjects with the Apo E4 genotype are more responsive to dietary intervention than subjects with the other Apo E genotypes [9–11]. Conversely, Savolainen et al [12] found that there was no difference in the change in LDL cholesterol among individuals with different Apo E genotype when subjects were following a high-fat, high-cholesterol diet. Taken together, these studies suggest that the Apo E genotype may influence the response of cardiovascular risk factors to worksite health promotion programs among male workers. Therefore, we conducted this study to determine if a 12-week worksite health promotion program improved cardiovascular risk factors and the effects differed according to Apo E genotype and obesity level in male Korean industrial workers.

Worksite is considered to be an excellent setting to attempt diet and lifestyle change among workers because workers spend most of their waking hours at worksite. Campbell et al [13] found that health promotion programs including changes in nutrition and physical activity achieved favorable behavioral changes and led to increased consumption of fruits and vegetables. Similar results were obtained when tailored health promotion programs that included smoking cessation programs, restriction of alcohol consumption, diet, exercise, and stress management were conducted in an attempt to reduce cardiovascular risk factors in male workers [14]. However, no such trials involving a structured nutrition counseling program have been conducted at a worksite in Korea to date. We hypothesized a 12-week worksite health promotion program would improve dietary intakes, which would reduce cardiovascular risk factors. In addition, these changes would be different within Apo E genotypes of a nonobese and obese groups. Consequently, this study was conducted to (1) examine the

effects of a worksite health promotion program on obesity indices, blood pressure, plasma lipid levels, and dietary intakes; (2) identify what changes exist in cardiovascular risk factors before and after the intervention program within a nonobese and obese groups of individuals with different Apo E genotype; and (3) investigate risk factors for obesity within individuals with different Apo E genotype. It is hoped that the results of this study will provide useful basic data for development of a systematic and effective worksite health promotion program.

2. Methods and materials

2.1. Subjects and study design

Written informed consent was obtained from all subjects, and the research protocol was approved by the Institutional Review Board of the Asan Medical Center (Seoul, Korea). Of the 202 subjects who volunteered for the worksite health promotion program, 61 were excluded due to low attendance or a lack of data from health examinations conducted before and after the intervention program. Therefore, a total of 141 middle-aged industrial male workers who participated in a worksite health promotion program from 2007 to 2008 were included in this study. The subjects were divided into a nonobese group (BMI, <25 kg/m²) and an obese group (BMI, ≥25 kg/m²). In addition, Apo E genotypes were categorized into 3 groups: Apo E2 (E2/2 and E2/3), Apo E3 (E3/3), and Apo E4 (E3/4 and E4/4). Subjects with the Apo E 2/4 genotype were excluded due to expected opposing biologic effects of the E2 and E4 alleles.

2.2. Worksite health promotion program

The worksite health promotion program focused on detailed and individualized dietary counseling intervention to induce the subjects to concentrate on modifying or changing their eating habits and lifestyle. A nutrition professional performed 5 face-to-face counseling interventions during the 12-week program that were customized based on the participants' health profiles. At the first encounter, the registered dietitian and subjects developed a plan of action and negotiated 2 to 3 specific and achievable dietary and physical activity goals to work on until their next counseling session. The subjects also received educational materials to view at home and in the workplace. During each session, the registered dietitian reviewed the subject's progress, reinforced positive changes or offered further guidance regarding the original goals, and negotiated additional goals. To support the lifestyle change through intervention, nutrition education materials were provided via e-mail. Each e-mail included information regarding nutrition or the relationship between diet and health, dietary tips, physical activity, and alcohol intake. Our goal for the dietary intervention was to modify or change identified unhealthy eating habits. Dietary counseling included how to limit high-risk foods containing high levels of saturated fat, cholesterol,

Download English Version:

<https://daneshyari.com/en/article/2809341>

Download Persian Version:

<https://daneshyari.com/article/2809341>

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