THE EFFECTS OF 8 WEEKS HIGH INTENSITY INTERVAL TRAINING (HIIT) WITH GARLIC COMPLEMENT ON SOME LIPID PROFILES IN OBESE INACTIVE WOMEN

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ABSTRACT

Background: regular exercise and garlic complement can independently improve lipid profiles. However, combining these lifestyle modifications may be more effective than either intervention alone. Therefore, We examined the effects of 8 weeks High Intensity Interval Training (HIIT) with and without garlic supplement on some lipid profiles in obese inactive women.

Method: The study used a 3-experimental group, pretest and posttest design with 40 obese women of mean age 35.9±1.7 years (BMI, more than 30) whom were purposefully selected and randomly divided into three experimental groups and control group. The first experimental group followed a 8-week training program on 3 days/week; the second one underwent on the same training program with garlic supplement intake simultaneously; the third group has just garlic supplement and a control group with no training and supplement. before taking primary and final blood samples, the 24-hour diet recall questionnaire was used to control the subject’s diet the day before taking blood samples. Total cholesterol and high-density lipoprotein (HDL) cholesterol and triglycerides were assessed by the enzymatic colorimetric method on an Architect C8000 system using the respective reagent kits. Low-density lipoprotein (LDL) cholesterol was calculated using the Friedewald formula.

Results: Improved lipid profiles were detected in the HIIT exercise and garlic complement in obese inactive women (p≤0.05). The results indicated that garlic supplementation and exercise training improved all lipid profiles including TG, HDL, LDL, Chol/HDL and VLDL, while the combination of HIIT and garlic supplement may have more significant effect on lipid profiles (p≤0.05).

Conclusion: HIIT exercise and garlic complement improves the lipid profiles such including LDL, HDL, Cholesterol and Triglyceride in obese inactive women. It appears that HIIT exercise and garlic supplement may represent an effective approach for improving lipid profiles in obese inactive women individuals.

Keywords: HIIT, garlic complement, lipid profiles.

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Introduction

Sedentary life style is an independent risk factor for chronic disease especially metabolic syndrome such as diabetes, hypertension and cardiovascular disease. Overweight and obesity has become a serious public health problem worldwide(8). On the other hand, metabolic syndrome is highly prevalent among 30-70 year olds of Iranian population(5). Physical inactivity, Lifestyle modification and subsequent weight gain may lead to a higher prevalence of metabolic syndrome. The lack of sufficient time and time consuming exercise programs are among the main causes of reduced physical activity in various members of the society, especially women. Moreover, the majorities of exercise protocols for reducing fat rely on long-term and regular exercises such as walking; have led to negligible weight loss and body fat burning(3). Thus, new exercise strategies that more effectively reduce body fat are required in overweight, inactive individuals.
Accumulating evidence suggests that high-intensity intermittent exercise (HIIE) looks like a time-efficient way to reduce fat for obese individuals. Therefore, it can replace traditional time-consuming protocols for those obese inactive women who do not have enough time to exercise. It was reported in a study that short bouts of brisk walking might be considered as a more applicable method in attracting overweight and obese women to physical activity in comparison to long bouts physical activity. It is suggested that this effect can be particularly used in sedentary women especially in developing countries. HIIE protocols have varied considerably but typically involve several sessions of sprinting at maximum speed immediately followed by short breaks or low intensity exercise. Each HIIE protocol can take from 6 seconds to 4 minutes. Most commonly the sprints are performed on a stationary cycle ergometer at intensity in excess of 90% of maximal oxygen uptake (VO₂max).

Although dieting has been the major fat loss method, exercise programs have been shown to decrease and preserve fat-free mass. On the other hand, the positive effect of garlic on lipid profiles has well been demonstrated in both human and animal studies. However, because of the high doses used in animal studies, it is not known to what extent might contribute to the lowering of serum cholesterol levels. The majority of previous studies testing the effects of exercise protocols have focused on a continuous or long-long intermittent training method.

In particular, no study has considered plasma lipids in obese inactive women using HIIT protocol and taking garlic supplement. As a result, this study investigated the effects of 8 weeks High Intensity Interval Training (HIIT) with garlic complement on some lipid profiles in obese inactive women.

Method

The study used a 3-experimental group, pretest and posttest design with 40 obese women of mean age 35.9±1.7 years (BMI, more than 30) whom were purposefully selected and randomly divided into three experimental groups and control group. All participants gave their informed consent to participate in the study. The protocol was approved by the ethics committee of Imam Khomeini International University (table1).

Eligibility criteria were: women, 30 to 40 years of age; body mass index (BMI) more than 30; Waist/hip ratio more than 0.80; doing exercise less than 1 day/week for <20 minutes/day during the previous 6 months. Exclusion criteria were: taking medication that would alter the heart rate response during exercise or that would affect metabolism or weight loss, being treated for psychological conditions, pregnant, recently pregnant or planning pregnancy, having a medical condition that could affect metabolism or body weight (e.g., diabetes) or that would limit exercise participation. The first experimental group followed a 8-week training program on 3 days/week; the second one underwent on the same training program with garlic supplement intake simultaneously; the third group has just garlic supplement and a control group with no training and supplement.

Table 1: study design.

<table>
<thead>
<tr>
<th>Group</th>
<th>Pretest</th>
<th>Posttest</th>
<th>Training Weeks</th>
<th>Training Intensity</th>
<th>Exercise Intensity (%)</th>
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<td>HIT</td>
<td>65</td>
</tr>
<tr>
<td>B</td>
<td>B</td>
<td>C</td>
<td>12345678</td>
<td>HIT + Garlic</td>
<td>65</td>
</tr>
<tr>
<td>C</td>
<td>C</td>
<td>Phrases</td>
<td>12345678</td>
<td>Phrases</td>
<td>65</td>
</tr>
</tbody>
</table>

Two experimental groups received three garlic capsules (500 mg Allicin) per day after breakfast, lunch and dinner. At the beginning and after the experimental period, changes in body weight, BMI and WHR were measured. All subjects were asked to follow their usual diet and avoid taking any supplements during the study. Moreover before taking primary and final blood samples, the 24-hour diet recall questionnaire was used to control the subject’s diet the day before taking blood samples. Venous blood was drawn by venipuncture into heparinized tubes from fasting subjects at baseline and after 4 and 8 weeks. Blood samples were centrifuged at 2,000× g for 20 minutes and plasma was kept frozen at -20°C until analysis. Total cholesterol and high-density lipoprotein (HDL) cholesterol and triglycerides were assessed by the enzymatic colorimetric method on an Architect C8000 system (Abbott Laboratories, Abbott Park, IL, USA) using the respective reagent kits. Low-density lipoprotein (LDL) cholesterol was calculated using the Friedewald formula.
**Statistical method**

The statistical analysis was performed using Statistical Package for the Social Sciences version 20.0 software. Values for continuous variables are expressed as the mean ± standard deviation (SD). The Shapiro-Wilk was applied to confirm normality. The significance of differences among groups was assessed using two-way repeated measures analysis of variance with an appropriate post hoc test (Turkey). Values of P < 0.05 were considered significant. In order to omit the primary differences in pre-test, analysis with covariate was used. No effect of primary difference was found on final result.

**Results**

Basal plasma lipid concentrations did not differ significantly between the three groups (p≥0.05). The lipid profile showed significant changes after 8 weeks of the intervention program in all three experimental groups (Table 2) (Fig. 1).

**Discussion**

The aim of this study was to investigate the effects of 8 weeks High Intensity Interval Training (HIIT) with garlic complement on some lipid profiles in obese inactive women. The results indicated that garlic supplementation and exercise training improved all lipid profiles including TG, HDL, LDL, Chol/HDL and VLDL, while the combination of HIIT and garlic supplement may have more significant effect on lipid profiles.

In other words, both HIIT and garlic supplementation have the potential to improve lipid profile in obese inactive women. These findings are in agreement with a number of previous studies. It has been suggested that garlic attenuates the hepatic activities of cholesterologenic enzymes, increases the excretion of cholesterol and inhibits cholesterol synthesis.

Consistent with our study, Seo et al. reported that aged garlic extract combined with regular exercise (aerobic and resistance) reduced cardiovascular risk factors in postmenopausal women. Previous studies have suggested several mechanisms by which regular training affects lipid profile. For instance, it is well documented that regular exercise increases the lipoprotein lipase (LPL) gene expression and activity in skeletal muscle resulting in decreased plasma triglyceride content. In addition, decrease in LDL-C levels could be attributed to the reduction in the activity of hepatic triglyceride lipase enzyme during long term physical exercise.

A few studies have also suggested that the HDL-raising effect of training could be largely explained by the concomitant loss of body mass or fat. Besides blood pressure lowering effect, garlic has favorable effect on lipid profile. Based on the previous research, garlic attenuates the hepatic...
activities of lipogenic and cholesterogenic enzymes\textsuperscript{(10,16)}.

The main limitation of this study is that our subjects were mediumly trained. It is possible, after recommended to have familiarization period, and run the training for a longer time, however it would be correct to exert appropriate caution when applying this protocol to overweight/obese subjects.

Based on the findings of the present study, it is concluded that garlic supplementation along with exercise training might have additive effect on lipid profiles in obese inactive women.

In summary, High Intensity Interval Training can be performed during the life and garlic supplement can also be taken by obese people in order to improve the lipid profiles. However, long term studies should investigate the benefits of high intermittent intensity exercise and garlic supplement.

References