The Effect of Eight Weeks *Salvia officinalis* Consumption Along with HIIT on Total Cholesterol Serum in Non-Athletic Middle-Aged Women

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Abstract

Salvia officinalis is a herbaceous plant from the family Hypericaceae. The importance of this plant has increased considerably in recent years as a medicinal plant especially in the treatment of depression and lowering total cholesterol and triglycerides. Medicinal plants such as salvia and aerobic exercise have each separately had favorable effects on reducing levels of harmful blood lipids. It seems that exercise along with the use of *Salvia officinalis* can have more effect on reducing harmful blood lipids. Participants in this study consisted of 40 non-athlete women with total cholesterol over 200 mg/dL with an average age of 35-50 years. In this study, subjects were randomly divided into four groups of 5 people: 1-control group 2- *Salvia officinalis* consumer group 3-HIIT 4- *Salvia officinalis* consumption group simultaneously with HIIT. *Salvia officinalis* was prepared by the researcher and each participant was given 4 g separate packages for 24 times. Group 2 and 4 boiled their medicinal plants in 150 ccs of water for 15 to 20 minutes and drank three times a week. Group 3 and group 4 were required to perform 4 to 6 repetitions of the 30-second Wingit test on the cycling Ergometer with maximum effort.

The number of Wingit test performances increased during each training week and if the subject could perform three repetitions in two consecutive sessions with the specified speed and load, 10% would be added to the load value. Recovery time between each repetition was four minutes of inactive rest. The total activity time for this training protocol was 20 to 40 minutes. In this study, the consumption of *Salvia officinalis* had a significant effect on reducing total cholesterol levels. Similar results were also observed in HIIT and *Salvia officinalis* + HIIT groups.

Keywords: HIIT; Medical plant; Middle age women; Non-athlete; *Salvia officinalis*; Total cholesterol

Introduction

Cardiovascular diseases are one of the main causes of mortality in the world. Obesity, smoking, hypertension, decreased HDL-cholesterol levels and increased LDL cholesterol and total cholesterol are the causes of cardiovascular diseases that can lead to increased mortality. Total cholesterol contains all types of lipoproteins, good cholesterol, and bad cholesterol [1]. Total cholesterol levels less than 200 mg/dl=desirable (low risk level), interstabial=200-239 mg/dl (increased risk level), 240 mg/dl or more=high (increase the risk rate to more than twice the optimum level) [2]. Suitable function for people with high total cholesterol is changing the way of life, not smoking and exercising daily, controlling and regulating body weight, and taking medication if needed [1].

Medicinal plants have attracted the attention of researchers due to their fewer side effects than chemical drugs. Some of these plants, as rich sources of natural antioxidants, are used in traditional medicine to control and treat diseases. The effective raw materials in plants that are stored are bio-equilibrium due to being associated with other compounds so that they are not accumulated in the body, so they have fewer side effects. This provides a good reason for new research on information from traditional medicine [3]. *Salvia officinalis* is a flowering plant, seed cyanide, dolpe, continuous petal, toby floral order, regal ancillary order, mint family and salvia genus. *Salvia officinalis* plant is a plant with a height of 30-60 cm with a woody and long root, an elevated stem, numerous branches, covered with short intricate cracks, simple leaves, wide, rectangular and petibre-shaped. This herb is the most valuable type of dark mint drug. In Iran, this plant is cultivated in East Azerbaijan and

some areas in gardens [4].

Salvia improves Alzheimer's blood sugar and has anti-inflammatory and anti-inflammatory effects. This plant has several active compounds such as Tion, Sinol, borneol, Penin, Flavonoids, saponins, glycosides, resins, vitamins E and C, tannins, resins, resins, and diterpenes. According to researches, *Salvia officinalis* contains bitter substances, catechin tannins (Salvia tannins), flavonoids (Epigenin, luteolin), volatile essential oils (Sinol, camphor, alpha, and beta-Tocubon), glycosides, tocopherol, rosmarinic acid, and ascorbic acid [5]. As mentioned earlier, studies so far show that salvia can have a lowering effect on blood lipids [3].

In recent decades, sports science researchers have developed a new method of exercise called high-intensity interval training using a combination of speed training and interval training. These exercises improve the aerobic and anaerobic systems. HIIT is a relatively short periodic activity with an intensity close to vo2 peak intensity. Due to the intensity of HIIT exercises, it may take from a few seconds to several minutes. High-intensity activity stages are separated by a few minutes of rest or low-intensity activity [6].

The mechanism of these exercises is that one stage of HIIT increases the concentration of energy substrates and the activity of enzymes associated with anaerobic metabolism, and then by increasing the intense repetition and its implementation intermittently along with recovery between the exercises, the need for muscle cells and metabolic pathways has changed, in a way that simultaneously forces the aerobic and anaerobic systems to regenerate adenosine triphosphate. Therefore, using these exercises can be expected to a wide range of metabolic and functional adaptations [7].

Evidence suggests that if the recovery time decreases between severe phases, the share of glycolic for energy supply decreases, and as a result, aerobic metabolism increases to compensate for this energy deficit. Little is known about the effects of HIIT, but increasing evidence suggests that this type of exercise causes more physiological stimulation compared to moderate-intensity continuous exercises, despite less time and less overall training volume. Although a high volume of traditional aerobic exercise reduces the risk of cardiovascular disease, they need more time to perform [8].

Studies have shown that in adults, six weeks of HIIT has led to similar metabolic adaptations in comparative endurance training. Recent research has shown that compared to moderate-intensity continuous exercise, HIIT can help to improve physical fitness and cardiovascular health more or equally [9]. This study investigated the probability of further reduction of total cholesterol in the case of consumption of *Salvia officinalis* at the same time as HIIT.

Method

The volunteers were 40 non-athlete women with total cholesterol above 200 mg/dl, with an average age of 35-50 years. Among these volunteers, 20 volunteers were randomly selected and participated in this study. The inclusion criteria were having total cholesterol above 200 mg/dl, no history of continuous exercise in the past year, no supplement or specific medication in the past three months, no smoking, no heart disease (or history). For this purpose, participants completed the medical records form and physical activity readiness questionnaire PAR_Q for screening, and all subjects were ranked low risk according to the American Sports Medicine (ACSM) ranking.

During a briefing, the objectives and plans of the research were explained by mentioning the possible risks to the participants and all participants signed the consent to participate in the study. All the points related to drinking herbal medicine and physical activity that the subjects had to observe during the research period were given to them.

48 hours before and 48 hours after the last training session, blood samples were collected from the left-hand vein of each case under investigation in sitting and resting position after twelve hours of fasting. All sampling was done between 7:30 and 9:00 a.m. in the medical laboratory. Total cholesterol was measured by the enzymatic method using Pars Azmedeh kits. All measurements were made automatically by Abbott's AKyon30 machine. For calibration, truca IU special standards and TrulabP and TrulabN kits of Pars Azmed Company were used for calibration.

Aerial parts of *Salvia officinalis* were collected from a farm in one of the villages of Khodabandeh (Abali Sofla). *Salvia officinalis* plant was grown in alfalfa plant farm. The collected plant was dried in shade at 25°C and then powdered by mill (manual).Recipes for preparation and consumption of *Salvia officinalis* were published. Each subject was obliged to use a medicinal plant three times a week, after which he informed the researcher *via* message. After each training session, the data were recorded by the researcher and collected for final evaluation. The training program continued for eight weeks. Subjects performed three sessions of physical exercise every week. The training consisted of 4-6 repetitions of the 30-second Wingit test on cycling Ergometer with maximum effort. The number of Wingit test performances increased every week and if the subject could perform three repetitions in two consecutive sessions with the specified speed and load, 10% would be added to the load value [9].

Recovery time between each repetition, four minutes of rest was considered inactive. After 5 minutes of warm-up, the subjects performed a 30-second cycling exercise in the 30-second Gainit test with a resistance of 75% of their weight. In this intense training method, subjects were asked to exercise with maximum effort. At the end of each training session, subjects were asked to cool their bodies for 5 minutes by stretching and walking [9].

Participants in the groups required to consume *Salvia officinalis* plant, three times a week, which were prepared by the researcher and each participant in separate packages of 4 grams for 24 times, boiled and drank water for 150 ccs for 15 to 20 minutes [10]. To interpret the results of the research, in quantitative variables to describe the data center, mean and median, and to describe the distribution of data, standard deviation, and inter-chart range were used. Wilcoxon, Chromatdale-Wallis, and ANOVA analyses were used to analyze the data univariately. The normality of data was performed using the Shapirovilk test and Q-Q chart. Covariance analysis was used to analyze the data in a multivariate way (to compare the groups with the control of pre-treatment variables). All analyses were performed using SPSS software version 22.

Results

The demographic characteristics of the subjects were assessed for total-Cholesterol level. As can be seen in the pre-test stage, none of the groups were significant at *P*-Value=0.05, which is addressed in Table 1.

The results of the subjects are presented for total-Cholesterol level after training and *Salvia officinalis* plant in Table 2.

Table 1: The results of descriptive information about the four groups, including mean, standard deviation, median.

Grupe	Control	*Salvia officinalis*	HIIT	*Salvia officinalis +HIIT*
SD±mean	277.80±28.20	286.20±35.67	282±54.36	298.80±48.30
Middle	282 (54.50)	294 (50.50)	264 (92)	302 (70)
P-Value	0.783	0.873	0.873	0.873

Table 2: The results of the subjects for blood Total cholesterol levels after training and *Salvia officinalis* consumption.

Grupe	Control	*Salvia officinalis*	HIIT	*Salvia officinalis +HIIT*
SD±mean	332.60±36.81	278.80±18.94	277.80±23.12	244.20±14.97
Middle	347 (68)	290 (33.5)	283 (44)	250 (28.5)

Table 3: Comparison table of Total cholesterol blood level in control group with other groups in post-test.

Grupe	B	SE	90% CI	*P*-Value
LDL-C before	0.67	0.10	0.45, 0.88	<0.001
*Salvia officinalis*_control	-39.06	8.29	-56.73, -21.40	<0.001
HIIT_control	-54.27	8.24	-71.84, -36.70	<0.001
HIIT+ *Salvia officinalis* _control	-95.21	8.31	-112.91, -77.50	<0.001

B=Unstandardized coefficient; SE=Standard Error; CI=Confidence Interval

Table 4: Containing two-by-two group comparison with total cholesterol levels.

Grupe	B	SE	95% CI	*P*-Value
HIIT_*Salvia officinalis*	15.20	8.28	-32.85, 2.45	0.086
Salvia officinalis+ HIIT_*Salvia officinalis*	-56.14	8.46	-74.18, -38.11	<0.001
Salvia officinalis+ HIIT_HIIT	-40.94	8.32	-58.67, -23.21	<0.001

As can be seen in Table 3, in the post-test stage, the three groups show a significant difference compared to the blood levels of total-Cholesterol in the groups. The significance level was considered to be 0.05.

As can be observed in Table 4, covariance analysis was used in the post-test compared to blood levels of total-Cholesterol in the groups and covariance analysis was used and at the significant level of 0.05, all three groups show a significant difference.**5. Conclusion**

This study aimed to investigate the effect of *Salvia officinalis* with HIIT exercise on increased levels of total cholesterol in middle-aged women. During the studies, consumption of 4 grams of *Salvia officinalis* alone three times a week for eight weeks had a significant effect on reducing total cholesterol at levels above 200 mg/dl compared to its blood levels in the pre-test. Also, performing HIIT alone for eight weeks and according to the protocol significantly reduced total cholesterol levels above 200 mg/dl and finally statistical studies showed that consumption of *Salvia officinalis* with HIIT had a significant effect on reducing total cholesterol at levels above 200 mg/dl.

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