

Plasma malondialdehyde response to aerobic exercise after *T. polium* supplementation

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ABSTRACT

*The purpose of this study was to determine the Influence *T. polium* supplementation on plasma malondialdehyde concentration after aerobic exercise. 24 subjects in double-blind design were allocated into supplement (n=12) and placebo (n=12) groups, and subjects received 125 ml/kg/day aqueous extract of *T. polium* or placebo for a period of 7 day. All subjects underwent in acute aerobic exercise. Blood samples were taken at pre supplementation, Pre exercise, Post exercise and 24 hours after exercise and Malondialdehyde(MDA) were measured. The results indicated that concentration of MDA as oxidative stress indices significantly increased at immediately and 24 hrs after aerobic exercise ($P<0.05$), and *T. polium* supplementation has no effect on concentration of MDA ($P>0.05$). The results of this study indicated that a single session of strenuous aerobic exercise induces oxidative stress in young athletes.*

Key words: *Teucrium Polium Extract, aerobic exercise, Malondialdehyde*

INTRODUCTION

It has been reported that strenuous acute exercise induces increase oxidative stress in active muscles and organism (1), and it seems that in sports and exercise training, oxidative stress can implicated in muscle damage (2) and development of symptoms of overtraining including increased fatigue, decreased immune function and decreased performance (3,4). However, it has been suggested that exercise-induced oxidative stress may reduce by supplementation with antioxidants. In this regards, recently, the use of herbal antioxidants, because of fewer side effects than synthetic antioxidant component, more has been attention from several researchers (5). The traditional medicinal plant *Teucrium polium L.* and related species have been used for centuries in traditional medicine for various types of pathological conditions (6) and some studies reported that therapeutic benefit of medicinal plants is often attributed to their antioxidant properties (7). Hence, the present study was conducted to determine the effects of *T. polium* supplementation on plasma malondialdehyde concentration after aerobic exercise

MATERIALS AND METHODS

In a double-blind design, 24 physical education students were allocated into two equal groups: supplement (n=12) and placebo (n=12) groups. The experimental procedures and potential risks were explained and informed consent was obtained from all subjects. The study protocol and methodology, in accordance with the Declaration of Helsinki, were approved by the Clinical Research Ethics Committee of the Mahabad Islamic Azad University of Iran and were conducted in the laboratory conditions (temperature 22 - 25 °C; humidity 50-55%). Physical and Physiological characteristics of the subjects at the beginning of the research are presented in Table 1.

Table1. Physical and Physiological characteristics of the supplement and placebo groups

	Supplementation (n=12)	Placebo (n=12)	p
Age (year)	23.13±2.07	22.56±1.80	0.490
Height (cm)	178.01±3.20	174.38±7.17	0.604
Weight (kg)	77.22±7.17	75.9±2.6	0.341
BMI (kg/m ²)	24.21±1.70	23.50±1.50	0.299
Body fat (%)	19.55±3.40	18.36±3.32	0.394
VO ₂ max (ml/kg/min)	41.35±3.5	42.12±2.74	0.195

Values are mean ± standard deviation

There were no differences among groups at the beginning of the research for age, VO₂max, body weight, height, and BMI and body fat percent ($p > 0.05$).

Subjects' height (nearest 0.1 cm) and weight (nearest of 0.1 kg) were measured using a stadiometer and digital scale, and BMI (body weight [kg]/height [m²]) was calculated. Fat density (fat mass) was predicted from the skin-fold measurements taken on the right side of the body using a calliper (Baseline Dconomy 'Slim-Guide') at the triceps, abdominal, and super iliac sites after 10 h of fasting. Percentage body fat was then calculated by using the regression equations described by Brozek, et al. (1963). Moreover, one week before the study protocol the maximal oxygen uptake or VO₂max of each subject was determined by maximal multistage 20-m shuttle run test (8). The supplemented group was given prepared aqueous extract of *T. polium* (125 ml/kg/day), two times per day for 7 days, as described previously (9), and the control group received a placebo of the same form and size at the same times. All subjects reported adherence to the experimental protocol and complete ingestion of the supplement.

One week prior to initiation of the study protocol, all participants underwent a familiarization session to exercise test (beside of the determining of VO₂max). The subjects performed a gentle warm-up before the start of exercise test. They then performed a maximal multistage 20-m shuttle run test. The shuttle run test was carried out on flat terrain and between two parallel lines 20 m apart, which was performed in form of continuous running with progressive intensity. The test ended when the participant failed to come within 2 m of the ends of the lines at the moment indicated by the tape. The maximal aerobic exercise protocol utilized in this study has been reported in previous studies (10). Blood samples were collected prior to supplementation, pre exercise, immediately post exercise and 24hrs following the exercise test and Plasma malondialdehyde (MDA) concentrations spectrophotometrically were assayed by measurement of thiobarbituric acid reactive substances (TBARS) assay according to the procedure of Uchiyama and Mihara (1978). All data were tested for homogeneity of variance and for normal distribution using a Kolmogorov-Smirnov test before statistical procedures were applied. Two-way repeated measures ANOVAs with 2 groups (polium supplementation and Placebo) and 5 time points (pre supplementation, Pre exercise, Post exercise and 24 hours after exercise) for Plasma malondialdehyde across the assessment protocol. For all analyses, the level of significance was $P < 0.05$. All results shown are Mean ±SD in the text, figures and table

RESULTS

Results demonstrated that no significant difference between MDA plasma in supplement and placebo before starting the study protocol ($p > 0.05$). Results showed that Concentrations of MDA significantly increased at immediately post-exercise and 24 hrs after aerobic exercise in both supplement and placebo groups ($P < 0.05$), but there were no differences in the pattern of change between groups (group effect, $P = 0.657$) (Fig. 1).

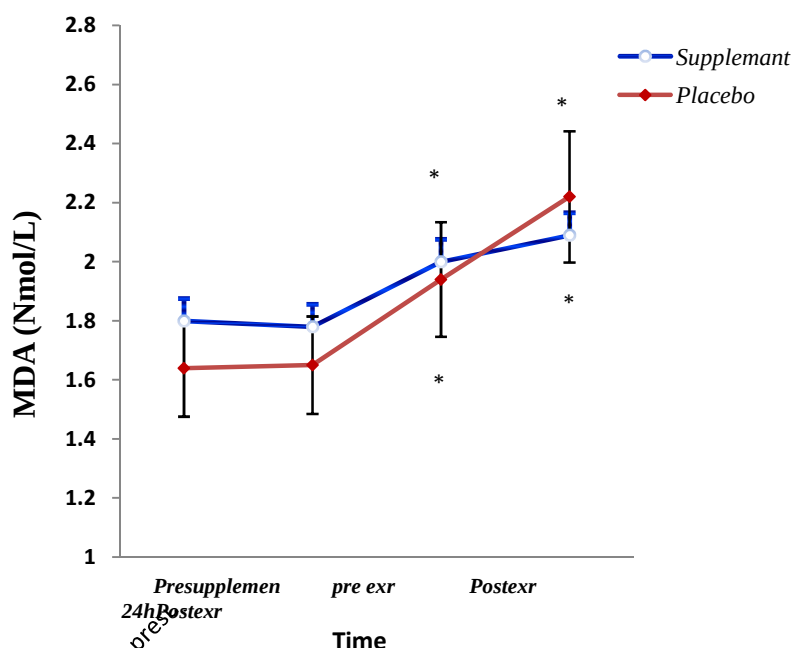


Figure1. Plasma malondialdehyde (MDA) concentration at pre supplementation, Pre exercise, Post exercise and 24 hours after exercise

* Indicate Significant difference ($P < 0.05$) compared with Presupplement and pre exercise.

DISCUSSION

This research was done to investigate the Influence *T. polium* supplementation on plasma malondialdehyde concentration after aerobic exercise. The interested finding of this study was that aerobic exercise increased plasma malondialdehyde biomarker. This finding confirms the results of some previous studies (11) whereas it contrasts to the finding of Saritaş et al (12). For example Fogarty et al (2011) reported that exhaustive aerobic exercise significantly increased malondialdehyde and lipid hydroperoxides in twelve healthy male subjects (11). It sees that increase oxygen consumption by mitochondria, causes an increase in free radical formation during exercise(13). But Saritaş et al. (2011) reported that aerobic exercise has no effect on oxidative stress in young trained men (12). The discrepancy between these results may be due to the exercise intensity, participant's age and body status.

Nevertheless, some studies suggested that antioxidant supplementation may prevent oxidative stress induced by strenuous exercise and recently, the use of herbal antioxidants in the physical exercise more has been attention from several researchers. Which it was indicated that black grape extract supplementation may attenuates blood oxidative stress in response to acute exercise in male rowers (14). Moreover, It has been suggested that *Teucrium polium* extracts have strong antioxidant effects by possesses a substantial protective effect and free radical scavenging mechanism against lipid peroxidation (15). But the results of the present research revealed that aqueous extract of *Teucrium Polium* have no effect on plasma concentration of MDA after aerobic exercise, hence, further studies are necessary to clarify the possible antioxidant effects of *T. polium* extract in athletes.

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