Annals of Clinical and Medical Case Reports

Research Article

ISSN 2639-8109 | Volume 6

Effect of Resistance Exercises with Salvia Officinalis Supplementation on the Response of Some Bio-Hormones in Overweight Male Students

Ozrudi MF[1*], Ozrudi SF[2] and Rohi A[3]

[1]Young Researchers and Elite Club, Babol Branch, Islamic Azad University, Babol, Iran

[2]Master of bachelor, Department of Food industry, Caspian Higher Education Institute, Mahmudabad, Iran

[3]Master of bachelor, Department of Physical Education, Tehran university, Tehran, Iran

[*]Corresponding author:
Mohammadbagher Forghani Ozrudi,
Young Researchers and Elite Club,
Babol Branch, Islamic Azad University,
Babol, Iran,
E-mail: mohammadbagher.forghani@gmail.com

Received: 11 Apr 2021
Accepted: 03 May 2021
Published: 08 May 2021

Citation:

Ozrudi MF. Effect of Resistance Exercises with Salvia Officinalis Supplementation on the Response of Some Bio-Hormones in Overweight Male Students. Ann Clin Med Case Rep. 2021; V6(13): 1-5

Keywords:

Resistance Exercises; Salvia Officinalis; Obese Men

1. Abstract

1.1. Background: The aim of this study was the effect of resistance exercises with sage supplementation on the response of some bio-hormones in overweight male students.

1.2. Methods: 16 of the male students at the Babol Islamic Azad University as subjects in this study were selected and randomly divided into four groups: a control group, Salvia officinalis groups, exercises group and exercises and Salvia officinalis group. The experimental group consisted of 8 weeks of endurance training three times a week. The dependent variable of this study is included TSH, T3, T4, testosterone and cortisol. Blood samples from after 12 hours fast and before and after 8 weeks (48 hours after the last training session) were collected.

1.3. Result: The results showed that endurance training not significant difference in TSH and T3. But T4 mean in pre and posttest has shown that difference means are meaningful increase in extract and train and extract groups. Of course, testosterone mean in pre and posttest has meaningful increase in training and training and extract group. also, Comparison of testosterone means between groups showed that Endurance training group compared to the Salvia officinalis group and training and salvia officinalis groups were significantly different. but cortisol means in pretest and posttest has shown that difference means are meaningful decrease in training and extract group.

1.4. Conclusions: These results suggest that intensity and duration of the exercise training are important and an increase in accessible energy would result in a change in thyroid hormones levels.

2. Introduction

Exercises that involve the release of anabolic and catabolic hormone such as testosterone and cortisol will result in little to no accumulation of muscle mass but will burn lots of calories in the process of enhancing cardiovascular fitness. Since the benefits of exercise are virtually all hormonally mediated, it follows logically that manipulating levels of key hormones in the body can produce exaggerated responses to exercise. An example is the use of synthetic testosterone hormone in athletes [1]. Therefore, this study was conducted to assess the effects of progressive endurance training with salvia officinalis extract on TSH, T3, T4, testosterone and cortisol in obese men students.

Excessive adiposity increases oxidative stress, and thus may play a critical role in the pathogenesis and development of obesity-associated comorbidities, in particular atherosclerosis, diabetes mellitus, and arterial hypertension. Improved body composition, through exercise training and diet, may therefore significantly contribute to a reduction in oxidative stress. Further, some foods high in antioxidants (e.g., salvia officinalis) provide additional defense against oxidation [2, 3].

Salvia officinalis is a plant that belongs to the Zingiberaceae fami-

ly. It is indigenous to Southeast Asia, and for centuries has been an important ingredient in Chinese, Ayurvedic, and Unani-tibb herbal medicines for the treatment of different diseases. It has been widely speculated that salvia officinalis might be beneficial to human health because it exerts antioxidant activity. The main components of salvia officinalis are 6-salvia officinalis ol, 6-shogaol, 8-salvia officinalis ol, and 10-salvia officinalis ol and these constituents have previously been shown to exhibit strong antioxidant activity in vitro. Salvia officinalis extract has been shown to reduce oxidative stress and increase plasma nonenzymatic antioxidant capacity in rodents Also known as ground nut, it grows primarily in wooded areas of the northeastern Unites States and Canada. Panax zingiberensis, commonly called salvia officinalis ginseng, is an endangered species in China [4, 5].

through exercise training and diet, may therefore significantly contribute to a reduction in oxidative stress. Further, some foods high in antioxidants (e.g., salvia officinalis) provide additional defense against oxidation [6].

We have recently shown that salvia officinalis supplementation, alone or in combination with endurance training, can reduce chronic low-grade inflammation, although the mechanism for this effect is not known. We speculate that the antioxidant properties of salvia officinalis may produce at least some of this beneficial effect. Supplementation with salvia officinalis combined with strength training reduces the damage wreaked by aggressive molecules in obese people, but the combination doesn't work better than either supplementation or training alone [5, 7].

The researchers also looked at the effect of the supplementation and the weight training on the subjects' body composition, and discovered that strength training with or without salvia officinalis led to an increase in lean body mass. The combination group seemed to do better than the strength-training group [8].

Increased activity of the pituitary-thyroid axis, as well as the adrenal cortex, plays a major role in adaptations to exercise training. Moreover, it has been Demonstrated that changes in their secretory activity in response to training are not only closely correlated with muscular work intensity, but also influenced by Food consumption. However, few studies have been published on hormonal regulation during endurance training. In this paper. We report on the changes in concentration of thyroid Stimulating hormone (TSH), thyroxine (T4), triiodothyronine (T3), testosterone and cortisol in plasma after of endurance training and consumption salvia officinalis extract [9].

Thyroxine (T4) and triiodothyronine (T3) are iodine- containing hormones secreted from the thyroid gland into blood circulation. Most of the circulating T3 and T4 are bound to serum proteins and only a fraction of them circulates freely. The secretion of T3 and T4 is stimulated by the pituitary hormone TSH (thyroid stimulating hormone) by a feedback mechanism [10].

Thyroid hormones have various effects on the reproductive system of the human men. Change in thyroid function, especially hypothyroidism, could be cause lead to impaired male fertility [11]. Hypothyroidism are often accompanied by increased serum free testosterone. These results protect the functional role of moderate exercise in this high-risk population. The results indicated that moderate- intensity exercise without significant weight loss improved several components of the lipoprotein profiles of men [6].

the ratio of testosterone/cortisol is considered to be a suitable biomarker for monitoring the relative anabolic/catabolic state [12]. This ratio might even be used to modify the amount of resistance or endurance training that is performed [11].

It was reported that there was a noticeable increase in the levels of testosterone without a big difference in cortisol levels after maximum endurance training [13]; and this variation in adrenal hormones may be related to subjects having differences in their response to exercise [14]. While, cortisol has a catabolic effect, testosterone is responsible for the stimulation of the anabolic process of skeletal muscle growth which increases linearly in response to exercise [13, 14].

also reported significantly increased serum and testicular testosterone levels as well as increase in weight of the testis and testicular cholesterol level in healthy rats. but one preliminary study by showed high statistically significant increase of serum hormones ($p<0.01$) in infertile men [12]. After 30-week treatment serum testosterone has increased by 17,7%, serum luteinizing hormone by 43,2% and serum follicle-stimulating hormone by 17,6%; dosage of salvia officinalis used was not disclosed [14]. The researchers wanted to determine the effect of salvia officinalis on luteinizing hormone, testosterone levels, and certain semen parameters of infertile men. The researchers found that testosterone concentration levels increased significantly among infertile men who were given a salvia officinalis supplement. The total increase was determined to be 17.7% [12, 15].

The most important glucocorticoid in humans is cortisol which is essential for life. Cortisol is secreted in response to various stressful situations. Cortisol mobilizes glucose amino acids and obesity acids, increases vascular tone and inhibits allergic and immune reactions [8, 11].

3. Material and Methods

3.1. Participants

This study is semi-experimental. statistic society of this study was male students at the Babol Islamic Azad University. 16 obese males [88±4.7 kg body weight, aged 21±2 years] volunteered for participation after receiving a detailed explanation of the study. All the participants had to meet the following criteria prior to enrollment in the study: no regular participation in physical activity, no current chronic health problems, nonsmokers, no cardiovascular, metabolic, or respiratory disease; and no consumption of any di-

etary antioxidant supplements or drugs within the past 6 months.

3.2. Research Design

Subjects were randomly assigned to 4 groups, control group, Salvia officinalis groups, training group, training and Salvia officinalis group. Then salvia officinalis extract dried in exposure to air without any exposition to sunlight, on a clean textile. For better drying the plants were high and down until they lost their water. Dried mistletoe (leaf and stem) homogenized to affine powder. Distilled water (100 ml-70-80) was poured in Erlenmeyer flask containing 30 g powdered material and placed in Ben Murray for 24 hours in 60). Then removed from the heat source and then was filtered. Each subject consumed 10 mg/kg/day of extract for six weeks of intervention [16, 17].

All anthropometric measurements were performed by the same specialist person on the day the blood samples were taken. Height and weight were measured while the participants wore only underwear, and BMI [body weight (kg)/height (m2)] was calculated. Body obese percent (BF%) was estimated from skin-fold measurements taken on the right side of the body at the triceps, abdominal, and suprailiac sites after 10 hours of fasting, and calculated using the formula of Bro-zek et al. [18]. All subjects in training group, training and Salvia officinalis group performed 40 min of endurance training 3 d/wk at 60-75% maximum heart rate reserve (MHRR). The rest period, as running slow and ranges ⁄35-45 heart rate reserve and were running about two minutes.

3.3. Data Analysis

All tests were carried out early in the afternoon, after the subjects had fasted for the previous 8h. Successive tests were separated by a day's rest. Measurements were made toward the end of the training season. Heart rate was continuously recorded during exercise by Polar Vantage XL telemetric heart rate monitors. Blood samples (10 ml) were obtained from an antecubital vein after resting in a supine position for 15min before, and immediately (less than 30 sec) after each training event. Plasma TSH, T4, T3, testosterone and cortisol were measured by Quality Immunoassay Kits from company Diagnostics Biochem Canada Inc (DBC).

3.4. Procedure

To demonstrate the effectiveness of the independent variable and the comparison between groups, t-test and ANOVA were used. To determine differences between the groups, the Scheffe test was used that showed significant changes in any of the variables. Statistical analyses were performed using SPSS23 Software.

4. Results

Results of research has shown that 8 weeks of endurance training program causes decrease in weight body and Obese mass ($p \leq 0.05$). The effects of endurance training and salvia officinalis extract on TSH, T3, T4, testosterone and cortisol shown for the groups in table 1.

Table 1: The results of Paired t-test and changes in hormonal

Hormone	Groups	Pre-test	Post-test	P
TSH	exercises	3.57±0.97	3.5±0.94	P=0.999
	extract	3.6±0.45	3.63±0.43	P=0.402
	exercises +extract	2.87±0.9	2.58±0.89	P=0.598
	control	2.32±0.7	2.33±0.73	P=0.598
T3	exercises	1.25±0.33	1.32±0.27	P=0.250
	extract	1.1±0.19	1.11±0.18	P=0.733
	exercises +extract	1.22±0.29	1.23±0.27	P=0.598
	control	1.07±0.32	1.07±0.36	P=1.000
T4	exercises	7.11±1.9	7.16±1.72	P=0.056
	extract	6.54±0.81	6.68±0.83	*P=0.017
	exercises +extract	6.63±1.19	6.92±1.26	*P=0.011
	control	6.65±1.16	6.63±1.17	P=0.35
Testosterone	exercises	5.47±0.76	5.97±0.86	*P=0.00
	extract	5.50±0.95	5.45±0.93	P=0.565
	exercises +extract	5.50±0.97	5.91±0.70	*P =0.006
	control	5.54±1.39	5.55±1.37	P=0.467
Cortisol	exercises	169±24.06	171.25±25.41	P=0.164
	extract	167.38±15.6	173.5±12.31	P=0.161
	exercises +extract	160.38±31.4	150.6±31.4	*P=0.019
	control	165.25±25.21	166.3±25.89	P=0.374

Results of research has shown that endurance training program not significant difference in TSH means in any of the four groups. also, Comparison of TSH means between groups showed that there was no significant difference between the groups ($p = 0.672$). By considering of T3 means difference in pre and posttest was not meaningful in four groups. Also, Comparison of T3 means between groups showed that there was no significant difference between the groups ($p=0.096$).

Comparison of T4 mean in pretest and posttest has shown that difference means are meaningful increase in extract and exercises and extract groups ($p=0.017$, $p=0.011$). Also, Comparison of T4 means between groups showed that there was no significant difference between the groups ($P=0.994$).

Comparison of testosterone mean in pretest and posttest has shown that difference means are meaningful increase in training and ex-

ercises and extract group (p=0.00, p=0.006). Also, Comparison of testosterone means between groups showed that there was significant difference between the groups (P=0.001). The results of post hoc Bonferroni test showed that endurance group compared to Salvia officinalis extracts group and endurance and Salvia officinalis extract group was significantly in testosterone hormone in obese men.

Comparison of cortisol mean in pretest and posttest has shown that difference means are meaningful decrease in exercises and extract group (p=0.019). Also, comparison of cortisol means between groups showed that there was significant difference between the groups (P=0.001). The results of post hoc Bonferroni test showed that group of endurance exercises and Salvia officinalis extracts compared to Salvia officinalis extracts group and endurance group was significantly in cortisol hormone (Table 1).

5. Conclusions

In conclusion, the results of this study indicated that endurance training not significant difference in TSH means in any of the four groups also T3 in pre and posttest was not meaningful in four groups. but T4 mean in pre and posttest has shown that difference means are meaningful increase in extract and train and extract groups. Of course, testosterone mean in pre and posttest has shown that meaningful increase in training and training and extract group. but cortisol mean in pretest and posttest has shown that difference means are meaningful decrease in training and extract group.

The investigation revealed that examined the thyroid hormone levels of professional cyclists during a 3-week stage competition, they concluded that serum T4, FT4 and FT3 levels showed a significant increase by the last week of competition while concentrations of TSH and T3 remained unchanged [3, 19].

Exercise training and consumption of foods rich in antioxidants may increase physiological antioxidant defenses and thus minimizes oxidative stress. This study investigated the effects of A potential mechanism for the endurance training-induced reduction of oxidant stress could include contraction-induced antioxidant enzyme upregulation [3, 15, 20]. Other research showed that there were no statistically significant differences among three measurements in the serum levels of TSH and thyroid hormones [3, 6]. This current study shows that as compared to the thyroid hormone values during low intensity exercise (45% max. heart rate), there is an increase in TSH values at moderate intensity (70% max. heart rate) and high intensity exercise levels (90% max. heart rate) [3].

Throughout the world of testosterone boosting supplements, there are numerous ingredients that are commonly used to help the body increase its production of testosterone naturally or to increase the production of luteinizing hormone (LH). The goal is to produce freer testosterone, as opposed to bound testosterone. This will help the individual gain more energy, build muscle mass, and have an increased libido. Salvia officinalis is one of those ingredients that has the potential to promote an increase in testosterone production in the body [1, 6].

More noteworthy is that serum luteinizing hormone concentration levels significantly increased for infertile men after treatment with salvia officinalis. The numbers that were found in this research study are as follows: (6.475±0.92 mlU/ml) as compared with before treatment (3.676±0.789 mlU/ml). Serum LH level was increased after treatment by 43.2%. The researchers found that treating with salvia officinalis significantly increases luteinizing hormone and testosterone levels [2, 8, 14].

The researchers in this study determined that there wasn't a significant impact on luteinizing hormone for these test subject rats. They did find that a significant increase in salvia officinalis intake on a daily basis increased total testosterone levels as well as sperm viability and motility [16-17, 21]. The endocrine system, by Balanced of anabolic and catabolic processes, plays a major role in the physiological adaptation to exercise training. Hormonal assays particularly anabolic (testosterone) and catabolic (cortisol) hormones have been suggested as being valuable indicators of the exercise intensity and work load. The ratio between anabolic and catabolic hormones has been used to determine the readiness status of individuals. Whereas, the free testosterone to cortisol ratio is used as an adaptation exercise index for males [11-12, 20]. Exercise training produces changes in the concentration of several biologically active molecules including cortisol and testosterone, which play pivotal roles as catabolic and anabolic agents in gluconeogenesis via the proteolytic pathway. The storage of glycogen and muscular protein synthesis is stimulated by testosterone [8, 12].

In summary, the intensity and duration of the exercise training are important and an increase in accessible energy would result in a change in thyroid hormones levels. Therefore, we can conclude that exercise can change hormonal concentration of T4. Of course, Thyroid function depends to a certain degree on the exercise intensity and perhaps to other factors such as specific characteristics of the athletes. But no significant changes in TSH and T3. But Individuals who consume salvia officinalis may very well help to boost serum testosterone levels in the body.

Reference

1. Ha-Ja. Hormonal Response to exercise. World of sports science Rev. 2010; 34-435.
2. Ahn YM, Kim SK, Lee SH, Ahn SY, Kang SW, Chung JH, Kim SD, Lee BC. Renoprotective effect of Tanshinone IIA, an active component of Salvia miltiorrhiza, on rats with chronic kidney disease. Phytotherapy research. 2010; 24(12): 1886-92.
3. Ciloglu F, Peker I, Pehlivan A, Karacabey K, İlhan N, Saygin O, Ozmerdivenli R. Exercise intensity and its effects on thyroid hormones. Neuroendocrinology letters. 2005; 26(6): 830-4.
4. Atashak S, Peeri M, Azarbayjani MA, Stannard SR, Haghighi MM.

Obesity-related cardiovascular risk factors after long-term resistance training and ginger supplementation. Journal of sports science & medicine. 2011; 10(4): 685.

5. Oboh G, Henle T. Antioxidant and inhibitory effects of aqueous extracts of Salvia officinalis leaves on pro-oxidant-induced lipid peroxidation in brain and liver in vitro. Journal of medicinal food. 2009; 12(1): 77-84.
6. Tremblay MS, Copeland JL, Van Helder W. Influence of exercise duration on post-exercise steroid hormone responses in trained males. European journal of applied physiology. 2005; 94(5-6): 505-13.
7. Kota N, Krishna P, Polasa K. Alterations in antioxidant status of rats following intake of ginger through diet. Food chemistry. 2008; 106(3): 991-6.
8. Smilios I, Pilianidis T, Karamouzis M, Tokmakidis SP. Hormonal responses after various resistance exercise protocols. Medicine & Science in Sports & Exercise. 2003; 35(4): 644-54.
9. Mohamed GA, Ibrahim SR, Elkhayat ES, El Dine RS. Natural anti-obesity agents. Bulletin of Faculty of Pharmacy, Cairo University. 2014; 52(2): 269-84.
10. Altaye KZ, Mondal S, Legesse K, Abdulkedir M. Effects of aerobic exercise on thyroid hormonal change responses among adolescents with intellectual disabilities. BMJ open sport & exercise medicine. 2019; 5(1): 000524.
11. Silva TS, Longui CA, Faria CD, Rocha MN, Melo MR, Faria TG, et al. Impact of prolonged physical training on the pituitary glucocorticoid sensitivity determined by very low dose intravenous dexamethasone suppression test. Hormone and metabolic research. 2008; 40(10): 718-21.
12. Grandys M, Majerczak J, Duda K, Zapart-Bukowska J, Kulpa J, Zoladz JA. Endurance training of moderate intensity increases testosterone concentration in young, healthy men. International journal of sports medicine. 2009; 30(07): 489-95.
13. Ahmadi R, Balali S, Tavakoli P, Mafi M, Haji GR. The effect of hydroalcoholic leaf extract of Salvia officinalis on serum levels of FSH, LH, testosterone and testicular tissue in rats. KAUMS Journal (FEYZ). 2013; 17(3): 225-31.
14. Kraemer WJ, Ratamess NA. Hormonal responses and adaptations to resistance exercise and training. Sports medicine. 2005; 35(4): 339-61.
15. Khaki A, Khaki AA, Hajhosseini L, Golzar FS, Ainehchi N. The anti-oxidant effects of ginger and cinnamon on spermatogenesis dys-function of diabetes rats. Afr J Tradit Complement Altern Med. 2014; 11(4): 1-8.
16. Kianbakht S, Abasi B, Perham M, Hashem Dabaghian F. Antihyperlipidemic Effects of Salvia officinalis L. leaf extract in patients with hyperlipidemia: a randomized double-blind placebo-controlled clinical trial. Phytotherapy Research. 2011; 25(12): 1849-53.
17. Zancan KC, Marques MOM, Petenate AJ, et al. Extraction of salvia officinalis (Zingiber officinale Roscoe) oleoresin with CO2 and co-solvents: a study of the antioxidant action of the extracts. J Supercrit Fluids. 2002; 24: 57-76.
18. Brozek j, Henschel A, editors. Techniques for Measuring Body Composition. Washington, DC: National Academy of Sciences. 1961; 223-44.
19. van Geffen C, Bavegems V, Duchateau L, De Roover K, Daminet S. Serum thyroid hormone concentrations and thyroglobulin autoantibodies in trained and non-trained healthy whippets. The Veterinary Journal. 2006; 172(1): 135-40.
20. Kar A, Panda S, Bharti S. Relative efficacy of three medicinal plant extracts in the alteration of thyroid hormone concentrations in male mice. Journal of ethnopharmacology. 2002; 81(2): 281-5.
21. Ali BH, Blunden G, Tanira MO, Nemmar A. Some phytochemical, pharmacological and toxicological properties of ginger (Zingiber officinale Roscoe): a review of recent research. Food Chem Toxicol. 2008; 46(2): 409-20.