Endurance training and ginger supplement on TSH, T3, T4 and testosterone and cortisol hormone in obese men

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Abstract:
Introduction: The aim of this study was the effect of 8 weeks endurance training with ginger extract on some of anabolic and catabolic hormone in obese men students.

Materials & Methods: 32 of the male students at the University Khatamalanbiya as subjects in this study were selected and randomly divided into four groups: a control group, Ginger groups, training group and training and Ginger 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 hour fast and before and after 8 weeks (48 hours after the last training session) were collected.

Result: the results showed that endurance training not significant difference in TSH and T3. but T4 mean in pre and post test has shown that difference means are meaningful increase in extract and train and extract groups. Of course testosterone mean in pre and post test 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 Ginger group and training and ginger groups were significantly different. But cortisol mean in pre test and post test has shown that difference means are meaningful decrease in training and extract group.

Conclusion: 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.

Introduction

It was demonstrated that there was a remarked relationship in the levels of hormones levels with endurance training (1). 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. Therefore, this study was conducted to assess the effects of progressive endurance training with ginger extract on TSH, T3, T4, testosterone and cortisol in obese men students (11).

It is shown that there was relationship between levels of hormones levels with weight and BMI (21, 22). Excessive adiposity increases oxidative stress, and thus may play a critical role in the pathogenesis and development of obesity-associated co morbidities, in particular atherosclerosis, diabetes mellitus (25-29), and arterial hypertension. Improved body composition through exercise training and diet (22, 23, 24) may therefore significantly
contribute to a reduction in oxidative stress. Further, some foods high in antioxidants (e.g., ginger) provide additional defense against oxidation (5, 9).

In recent years, photochemicals are used to treat disease and lose weight (22, 23, and 24). Ginger is a plant that belongs to the Zingiberaceae family. 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 ginger might be beneficial to human health because it exerts antioxidant activity. The main components of ginger are 6-gingerol, 6-shogaol, 8-gingerol, and 10-gingerol and these constituents have previoulsy been shown to exhibit strong antioxidant activity in vitro. Ginger extract has been shown to reduce oxidative stress and increase plasma nonenzymatic antioxidant ca-pacity in rodents. Also known as ground nut, it grows primarily in wooded areas of the northeastern Unites States and Canada. Panax zingiberensis, commonly called ginger ginseng, is an endangered species in China(4,16).

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 ginger extract(8).

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 circulate freely. The secretion of T3 and T4 is stimulated by the pituitary hormone TSH (thyroid stimulating hormone) by a feedback mechanism (7). 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 (17). 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 (19).
the ratio of testosterone /cortisol is considered to be a suitable biomarker for monitoring the relative anabolic/catabolic state(10). This ratio might even be used to modify the amount of resistance or endurance training that is performed(17). 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 (1) and this variation in adrenal hormones may be related to subjects having differences in their response to exercise (15). 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(1,15). 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 (10). 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 ginger used was not disclosed (15). The researchers wanted to determine the effect of ginger 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 ginger supplement. The total increase was determined to be 17.7%(4,10). The most important glucocorticoid in humans is cortisol which is essential for life. Cortisol is secreted in response to various stressful situations. Cortisol mobilises glucose amino acids and obesity acids, increases vascular tone and inhibits allergic and immune reactions (17,18).

Material and Methods:
This study is semi-experimental. statistic society of this study was male students at the University Khatamolanbiya. Thirty-two 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 dietary antioxidant supplements or drugs within the past 6 months. Subjects were randomly assigned to 4 groups, control group, Ginger groups, training group, training and Ginger group. Then ginger 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 a fine 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(13,20). 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. All subjects in training group, training and Ginger group performed 40 min of endurance training 3d/wk at 60-75% maximum heart rate reserve (MHRR). The rest period, as running slow and ranges 735-45 heart rate reserve and were running about two minute. 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 (10ml) were obtained from an antecubital vein after resting in a supine position for 15 min 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). 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 SPSS Software.

Results:

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

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 post test 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 pre test and post test has shown that difference means are meaningful increase in extract and train 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 pre test and post test has shown that difference means are meaningful increase in training and training and extract group (p=0.00, p=0.006).

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

<table>
<thead>
<tr>
<th>hormone</th>
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<th>Pre test M±SD</th>
<th>Post test M±SD</th>
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<tr>
<td>TSH</td>
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<td>3.57±.97</td>
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<td>1.32±.27</td>
<td>p=0.250</td>
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<tr>
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<td>1.07±.32</td>
<td>1.07±.36</td>
<td>p=1.000</td>
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<tr>
<td>T4</td>
<td>training</td>
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<td>7.16±1.72</td>
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<td>167.38±15.6</td>
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also Comparison of testosterone means between groups showed that there was significant difference between the groups (P=0.000) . The results of post hoc Bonferroni test showed that endurance group compared to Ginger extracts group and endurance and Ginger extract group was significantly in testosterone hormone in obese boys.

Comparison of cortisol mean in pre test and post test has shown that difference means are meaningful decrease in training 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 training and Ginger extracts compared to Ginger extracts group and endurance group was significantly in cortisol hormone. (Table 1).

Discussion:

In conclusion, the results of this study indicated goal is to produce more free testosterone, as that endurance training not significant difference opposed to bound testosterone. This will help the in TSH means in any of the four groups also T3 individual gain more energy, build muscle mass, in pre and post test was not meaningful in four and have an increased libido. Ginger is one of groups, but T4 mean in pre and post test has shown those ingredients that has the potential to promote that difference means are meaningful increase in an increase in testosterone production in the extract and train and extract groups.

Of course testosterone mean in pre and post test More noteworthy is that serum luteinizing has shown that meaningful increase in training and hormone concentration levels significantly training and extract group. but cortisol mean in increased for infertile men after treatment with pre test and post test has shown that difference ginger. The numbers that were found in this means are meaningful decrease in training and 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.

The investigation revealed that examined the after treatment by 43.2%. The researchers found thyroid hormone levels of professional cyclists that treating with ginger significantly increases during a 3-week stage competition, they concluded luteinizing hormone and testosterone that serum T4, FT4 and FT3 levels showed a levels(2,15,18).

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(4,8,12).

Other research showed that there were no statistically significant differences among three measurements in the serum levels of TSH and thyroid hormones (8,19).

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)(6,8).

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

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significant increase by the last week of The researchers in this study determined that there wasn’t a significant impact on luteinizing hormone

<table>
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<td>150.6±31.4</td>
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for these test subject rats. They did find that Ali BH, Blunden G, Tanira MO, et al(2008). Some significant increase in ginger intake on a daily phytochemical, pharmaco-logical and basis increased total testosterone levels as well as toxicological properties of ginger (Zingiber officinale Roscoe); a review of recent research. The endocrine system, by Balanced of anabolic Food Chem Toxicol. 46:409-420.

during anabolic and catabolic processes, plays a major role in the physiological adaptation to exercise training. Arash Khaki,1 Amir Afshin Khaki,1 Laleh Hormonal assays particularly anabolic. Hajhosseini and et al(2014). The Anti-Oxidant (testosterone) and catabolic (cortisol) hormones Effects of Ginger and Cinnamon on have been suggested as being valuable indicators Spermatogenesis Dys-function of Diabetes Rats. of the exercise intensity and work load. The ratio Afr J Tradit Complement Altern Med.11(4): 1–8. between anabolic and catabolic hormones has been used to determine the readiness status of Atashak S, Peeri M, Azarbayjani MA and et individuals. Whereas, the free testosterone to al(2011). Obesity-related cardiovascular risk cortisol ratio is used as an adaptation exercise factors after long-term endurance training and index for males(10,12,17).


protein synthesis is stimulated by testosterone(10,18). Cindy v, Vale‘rie, Luc D and et al(2006). Serum thyroid hormone concentrations and thyroglobulin

In summary, the intensity and duration of the autoantibodies in trained and non-trained healthy exercise training are important and an increase in whippets. The Veterinary Journal 172 135–140. accessible energy would result in a change in thyroid hormones levels. Therefore, we can Figen C, Ismail P, Aysel P, and et al(2005). Effect conclude that exercise can change hormonal of acute endurance exercise on thyroid hormone concentration of T4 . Of course Thyroid function values. Neuroendocrinol Lett; 26(6):830-834.
depends to a certain degree on the exercise intensity and perhaps to other factors such as Gamal A, Mohamed Sabrin R.M. Ibrahim Ehab specific characteristics of the athletes. But no S and et al(2014). Natural anti-obesity agents. significant changes in TSH and T3. but Individuals Bulletin of Faculty of Pharmacy, Cairo University. who consume ginger may very well help to boost Volume 52, Issue 2, Pages 269–284

serum testosterone levels in the body. Grandys M(2009). Endurance training of moderate intensity increases testosterone concentration in

Reference:


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