The Effect of High Intensity Interval Training Applied with Vitamin E Reinforcement on Thyroid Hormone Metabolism

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Abstract: The aim of the present research was to investigate the effect of vitamin E supplement applied with high intensity interval trainings (HIIT) on the thyroid hormone values. The research group consisted of 12 voluntary male sportsman; High intensity interval training and supplement groups (HIIT+V). HIIT group was participated only tabata model training program 3 days for 8 weeks. The HIIT+ V group was taken the vitamin e in addition to the trainings. Blood samples were taken two times from the participants in the resting situation baseline and after the trainings session. Thyroid hormones were analyzed in the serum values taken from obtained the bloods of individuals. SPSS program was used in order to the data. Analysis results demonstrated that, There were no significant differences in comparison the groups ($p>0,05$). Within group analysis; T3, T4 and TSH was different in the HIIT+V group, while it found significant change only in TSH level in the HIIT group. Conclusion, it was found that the 8weeks of HIIT and Vitamin E reinforcement affect the thyroid hormones levels. It could said that interval trainings may lead to changes in thyroid hormones levels and may more effective when applied with vitamin E.

Keywords: *Tabata; thyroid; vitamin E.*

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1. Introduction

Since people have started to participate in sports competitions, it has been stated that nutrition has a positive effect on physical performance as well as complementary effect on sport performance. Therefore, athletes began to use reinforcing products to maximize their performance (Molinero, & Marquez, 2009). Body shape and motivation may be important component of performance (Fagaras, Radu, & Rus, 2015; Rus, Radu, & Vanvu, 2016). Vitamins and minerals have an important effect in addition to training to maximize sporting performance. Vitamins are known to play an important role in biochemical events in our body (Çavdar, Cinel, Bayazıt, & Yılmaz, 2018; Öncü & İriadam, 2018). Among these vitamins, vitamin E is known to have a important effect on performance. Vitamin E is one of the most important antioxidants in the body and acts as an antioxidant defense system against the harmful effects of free radicals in the cells against oxidative stress associated with exercise (Demirci, Beytut, & Kamiloglu, 2011; Devrim, & Ayaz, 2018). It is a training model that demonstrates that adequate high intensity intermittent loading significantly increases both anaerobic and aerobic systems, possibly causing intense stimuli in both systems (Baynaz, Acar, Çinibulak, Atasoy, Mor, Pehlivan, & Arslanoğlu, 2017; Li, Li, Su, Ai, Duan, & Liu, 2018). Thyroid Hormones; It regulates carbohydrate, lipid and protein metabolism by synthesizing and secreting two hormones that are effective on basal metabolism and lipid metabolism and increasing oxygen use of body tissue cells. Furthermore, these hormones also act as regulators of metabolic functions by regulating the rate of cellular oxidation in all tissues (Bardak, & Kiziltan, 2018). Both exercise and some supplements can lead to biochemical changes in the human organism (Cinar, Talaghir, Akbulut, Turgut, & Sarikaya, 2017; Turgut, Bagir, Bozkus, Talaghir, & Sarikaya, 2019). The use of vitamin supplements in combination with training is to maximize the performance of athletes (Atabek & Ozdemir, 2010). In this field, it is stated that zinc supplementation, which is also given as a supplement with exercise, has some effects on thyroid metabolism (Cinar, Akbulut, & Sarikaya, 2017). In another study, it was found that different mineral supplements were applied together with exercise and may have effects on thyroid metabolism (Polat, Polat, Akbulut, Cinar & Marangoz, 2017).

In this context, in the present research, it was aimed to investigate the effect of vitamin E implementation on thyroid hormone metabolism with HIIT administered according to protocol of tabata for eight weeks.

2. Material and Methods

2.1. Participants

The research group consisted of 12 male voluntary individuals, the HIIT (n: 6) and the HIIT + V supplementation group (n: 6). The sportsmen were randomly divided to two groups and before starting the research they were informed about the research. The individuals who agreed to participate in the research were asked to sign the voluntary consent form.

2.2. Research Groups

High Intensity Interval Training + Vitamin E Supplement Group (HIIT+V):

Vitamin E (Daily: 400 IU (268 mg) supplementation and HIIT three days a week were administered for 8 weeks.

High Intensity Interval Training Group (HIIT):

Interval training was done three days/ a week for 8 weeks.

2.3. High Intensity Interval Training Method

Tabata method, which is one of the HIIT models, was used in the research. According to this method; The program consists of 8 repetitions (running) of 20 seconds loading, 10 seconds of rest is a training method (Tabata, Nishimura, Kouzaki, Hirai, Ogita, Miyachi, & Yamamoto, 1996).

2.4. Biochemical Measurements

In the study, bloods were taken from the sportsmen twice during resting condition, baseline and after the program (at the end of the eighth week). Obtained Bloods were centrifuged at 3000 rpm for 10 minutes and stored in the refrigerator in suitable conditions until the day of analysis. Triiodotironin (T3), Tiroxin (T4) and TSH (Tiroid stimulating hormone) values of the samples stored on the day of analysis were determined using the appropriate trademark auto analyzer.

2.5. Statistical Analysis

SPSS 22.0 software was used in the analysis of data. In order to find the differences, independent samples t-test was used for independent groups and paired samples t test was used in dependent groups to find intra-group differences. Significance level was accepted as $p < 0.05$.

3. Results

Table 1. Intra-group Comparisons of Research Groups

Variables	Groups	Pre-test	Pos-test	t	p
		Mean±Sd	Mean±Sd		
TSH	HIIT	2,38±0,47	3,62±1,20	-4,138	0,00*
	HIIT+V	3,07±1,24	3,41±1,23	-4,097	0,00*
T3	HIIT	3,89±0,20	3,50±0,72	-1,855	0,12
	HIIT+V	4,12±0,99	4,03±0,12	3,353	0,02*
T4	HIIT	1,40±0,16	1,40±0,01	0,000	1,00
	HIIT+V	1,38±0,09	1,32±0,07	4,419	0,00*

(p>0,05)* Sd: Standart Deviation

When Table 1 is examined; Intra-group comparisons, T3, T4 and TSH differences were significant in the HIIT+V group, There was only significant difference in TSH level in HIIT group (p<0,05).

Table 2. Inter-group Comparisons of Research Groups

Variable	HIIT Group		HIIT+V Group		t	p
	Pre-test	Pos-test	Pre-test	Pos-test		
	Mean±Sd	Mean±Sd	Mean±Sd	Mean±Sd		
TSH	2,38±0,47	3,62±1,20	3,07±1,24	3,41±1,23	0,299	0,77
T3	3,89±0,20	3,50±0,72	4,12±0,99	4,03±0,12	1,495	0,17
T4	1,40±0,16	1,40±0,01	1,38±0,09	1,32±0,07	2,276	0,07

(p>0,05)* Sd: Standart Deviation

When Table 2 is examined; When the T3, T4 and TSH levels of the participants were evaluated; There was no statistical differences between the groups (p>0,05).

4. Discussion

Although vitamin supplements are known to affect performance positively, researches about the effect of vitamin E support on performance are limited. The purpose of present study was to investigate the effect of vitamin E supplementation on thyroid hormone metabolism with high intensity interval training program for eight weeks. High intensity and long-term exercises increase thyroid hormone secretion. Thyroid hormones improve endurance in severe exercises by increasing the body's use of carbohydrates, fats, protein metabolism, along with exercise. (Bardak, & Kiziltan, 2018; Yalçın & Besler, 2016). Pancar, Özdal & Çınar (2017) have reported that 4-week exercise program showed significant changes in thyroid hormone metabolism in obese children. Philippou, Maridaki, Tenta, & Koutsilieris. (2017) have reported that there was no significant differences in TSH hormone value of short-term eccentric exercises. In another study, it was stated that diet and six-month exercise program increased the TSH value in Palestinian obese women, and T3 and T4 levels decreased significantly compared to the pre-study period (Mwafy, Yassin & Mousa, 2018). Çolak, Kıyıcı, Eroğlu, Ağırbaş, Ağgön & Uçan (2015) have reported that high intensity acute sauna and wrestling exercises had significant changes in thyroid hormone metabolism. Hoene, Irmeler, Beckers, Hrabě de Angelis, Häring, & Weigert. (2018) reported that vitamin E supplementation and acute exercise cause changes in lipid and fat metabolism.

5. Conclusion

Present research results are similar to the studies in general. This similarity is thought to result from the similar effects of vitamin E and thyroid hormone metabolism with exercise and in the live physiology. In conclusion, it was examined that high intensity interval training and vitamin E supplementation according to eight week tabata model had a significant effect on thyroid hormone metabolism. High intensity interval trainings may lead to changes in thyroid hormones levels and may more effective when applied with vitamin E. These differences are important in terms of athletes' health and performance, suggesting that appropriate doses of vitamin E supplementation can contribute positively to athletes' performance.

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