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Full Length Research Paper

The effects of four weeks training on leptin levels in junior female judokas

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The purpose of this study is to investigate the effects of four weeks judo training on plasma leptin levels. Twenty-five female national team athletes with a mean age of 18.12±1.12 years; body weight of 62.72±22.72 kg; body height of 164.28±7.28 cm, BMI of 23.17±6.28 kg/m^2; training experience of 6.56±5.44 years participated in this study. The data were collected from junior female judokas who trained six times in a week for two hours daily. Physical measurements and blood samples were taken before and after four weeks of training including technical, tactical and physical preparations. Body fat percentages were measured by using the Tanita Bioimpedance BC-418 (Tokio, Japan). Statistical Package for Social Science 15.0 (SPSS) was used to analyse the obtained results. Before and after the training, paired samples t-test was used to evaluate the differences between serum leptine and body fat percentages. Results of this study showed that pre-training serum leptin levels were significantly lower than post-training levels (p<0.01). There was also significant decrease in body fat percentages after four week training (p<0.01). Four weeks judo training results in a decrease in total body fat and serum leptin level in junior female judokas. It may be considered that lowered serum leptin levels were due to the decrease of the body fat percentage after four weeks training.

Key words: Plasma leptin, body fat, female judokas.

INTRODUCTION

Sport of judo needs dynamic and intermittent workloads with a high-intensity anaerobic activity (Degoutte et al., 2000). Judokas spend significantly high amount of energy during the training and competitions which affects energy balance, hormonal profile and metabolic hemostasis (Filaire et al., 2001). There was a limited number of studies related females judokas in the literature (Prouteau et al., 2007).

Leptin hormone has been a topic in several researches as it is associated with food intake and energy use directly. Regulation of the body weight and energy balance for human organism is one of the basic functions controlled by endocrine and central nevrous system.

Leptin has been recently defined as an adipocyte derived hormone and regarded as a regulator of the body weight and energy balance (Simsch et al., 2002). There are several studies showing the effects of exercise on leptin levels. Many of these studies are related to why leptin responds to exercise and shows adaptation to exercise (Robert et al., 2002). Leptin is efficient in controlling the body weight in professional athletes and exercise density and the amount of the energy spent are important in alternation in serum leptin level (Gomez-Merino et al., 2002). Exercise results in a decrease in fat mass and thereby effecting leptin levels. However, the exercise types requiring more calory and energy expenditure may result in more alterations in leptin levels (Perusse et al., 1997; Loucks et al., 1998). Decrease in plasma leptin levels associated with exercise may be balanced by nurition (Koistinen et al., 1998). Low leptin levels in athletes occur together with the energy deficit caused by the exercise and associated decreased fat percentage (Casimiro-Lopes et al., 2009). But, low fat proportion may not always indicate low leptin level. This result can be seen in some studies (Koury et al., 2007). They showed that unaltered fat proportion values occurred in spite of low leptin levels after the training (Koury et al., 2007). It is thought that exercise makes its effects on leptin through sympathetic adrenergic system (Torjman, 2001). It was suggested that alterations occuring in the levels of growth hormone, cortisol, insülin, testosteron, epinefrin and

Table 1. Plasma leptin levels pre-training and post-training.

Plasma leptin levels		N	X	S	t	Sig
Leptin	Pre-training	25	4.70	3.48	5.307	0.000**
	Post-training	25	2.96	1.96		

**There was significant difference at 0.01 level.

Table 2. Body fat levels pre-training and post-training.

Body fat levels		N	X	S	t	Sig
Body fat (%)	Pre-training	25	17.31	1.52	11.290	0.000**
	Post-training	25	15.48	1.60		

**There was significant difference at 0.01 level.

norepinefrin during the exercise result in delayed decrease in leptin (Essing et al., 2000). In this respect, there are also studies in the literature showing that short-term exercise (<60 min.) has no effect on serum leptin levels (Weltman et al., 2000; Essing et al., 2000; Houmard et al., 2000; Olive and Millller, 2001; Sütken et al., 2006; Yamaner et al, 2010).

The aim of this study is to investigate the effects of four weeks training on plasma leptin levels and body fat percentages in junior female judokas.

MATERIALS AND METHODS

Subjects

The mean values of the subjects were 18.12±1.12 years for age, 62.72±22.72 kg for body weight, 164.28±7.28 cm for body height, 23.17±6.28 kg/m^2 for body mass index, and 6.56±5.44 years for training experience, respectively. Body mass index was calculated using following formula, BMI=body weight (kg)/body $height^2$ (m) (Fahey et al., 2007).

Sample collections

The data were collected from junior female judokas who trained six times in a week for two hours daily for world championship. Physical measurements and blood samples were taken before and after four week training including technical, tactical and physical preparations. Body fat percentages were measured by the Tanita Bioimpedance BC-418 (Tokio Japan).

Statistical analysis

Statistical Package for Social Science 15.0 (SPSS) was used to analyse the obtained results. Before and after four weeks training, paired samples t-test was used to evaluate the differences between serum leptine and body fat percentages.

RESULTS

Serum leptin levels obtained after the training was statistically sigificantly lower than plasma leptin levels before the training (p=0.000) (Table 1).

Body fat levels obtained after the training was statistically significantly lower than body fat levels before the training (p=0.000) (Table 2).

DISCUSSION

Results of this study showed that plasma leptin and body fat percentages of judokas after judo training were significantly decreased. There are similarities with other studies reported in the literature (Landt et al., 1997; Leal-Cerro et al., 1998; Essig et al., 2000; Olive and Millller, 2001; Zaccaria et al., 2002; Yamaner et al., 2010). Burning the fat tissues through training and energy deficit associated with this case result in the same percentage of decrease in serum leptin levels (Witek et al., 2003). It was reported that long-term medium level exercises supress the plasma leptin levels related to the decrease of body fat percentage presented by BMI. But, it was noted that serum leptin levels did not alter in short-term exercise (Sütken et al., 2006).

Some researchers reported that these results were also in disagreement with the some studies (Essing et al., 2000; Olive and Millller, 2001). They found that exercise had no acute effect on leptin levels and they also reported that serum leptin levels were decreased 30 to 40% after the exercise (Essing et al., 2000; Olive and Millller, 2001). In another study on acute effects of training, there was a decrease in fat mass, while there was not any alteration in serum leptin levels after the training (Perusse et al., 1997).

In a study made by Türkmen, judo and cycling exercises were found to have no influence on leptin, LDL, triglyceride, total cholesterol level (Türkmen, 2011). In a similar study, Kishali found out that 8 weeks of exercise does not change serum leptin levels and body fat percentages of male university students (Kishali, 2011).

Some studies were carried out on animals in order to

determine the effects of exercise on leptin levels (Pagano et al., 1999). They reported that no alteration was found in leptin levels of obese animals after the exercise while leptin levels of animals with lower body weight showed decrease (Pagano et al., 1999). Conversely there were also other studies in which serum leptin levels of different subjects having different fat mass show difference in terms of their responses to exercise (Hickey et al., 1996; Moller et al., 1998).

Conclusions

It was found that judo training had a short term effect on plasma leptin level and body fat percentages. Following the four weeks training, there was a decrease in serum leptin levels and body fat percentages. The decrease in plasma leptin levels after training programme was associated with the decrease in body fat percentage. In other words plasma leptin levels may be altered depending on the body fat percentage.

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