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Features of Hormonal Status of Young Athletes in the Republic Sakha (Yakutia)

ABSTRACT

In the process of adaptation of an athlete in high training loads there happens the activation of hormonal control link adaptation process. Simultaneous study of testosterone and cortisol in the blood and index calculation anabolic reflect the level of adaptation of the athletes' organism, and its decrease indicates overtraining sportsman. The purpose of this study was to compare the average of the hormonal status of young athletes and adolescents not involved in sports.

Materials and methods. 54 youths aged 16-17 were investigated. 25 of these are young athletes, professional athletes. Control group consisted of 29 healthy peers not involved in sports. The studies were conducted during the recovery phase of the annual training cycle athletes on the basis of recreational and rehabilitation center of the Center of Sports Medicine and Rehabilitation of the State budget institutions of the Republic of Sakha (Yakutia), high school of sports. We investigated hormones testosterone and cortisol, calculated anabolism index, assessed the level of anxiety and stress of young men.

Results. Most athletes anabolic index 56.3% is in the range of less than 5, in 12.3% of subjects anabolism index was below 3 established a significantly higher concentration of testosterone ($p < 0.001$) in athletes with respect to youths not involved in sports 33.7% ($p < 0.001$). As the level of reactive anxiety occurs fairly significant increase in cortisol levels ($p = 0.004$) and testosterone ($p = 0.026$). It should be noted that increasing the level of cortisol reflects training stress in athletes, thereby developing them resistant to stresses.

Conclusions. In 56.3% of subjects athletes prevails catabolic metabolism, including 12.3 percent of them are in a state of overtraining. Athletes set higher levels of cortisol ($p < 0.001$) and testosterone ($p < 0.001$) than in non-athletes. With increasing degree of reactive anxiety significantly increased cortisol levels ($p = 0.004$) and testosterone ($p = 0.026$). Most athletes (64.6%) are stress-resistant ($p = 0.001$) types of people.

Keywords: athletes, testosterone, cortisol, anabolic index.

INTRODUCTION

Intense physical activity, typical of the current training process, characterized by constant body growing requirements of young athletes, which inevitably leads to overstress systems. [5,7].

One of the most important problems of sports training of young athletes is to evaluate the adaptive capabilities of the growing organism in the period of the endocrine system [4,9]. In the process of adaptation of an athlete in high training loads there happens the activation of the hypothalamic-pituitary-adrenocortical and sympathy - adrenal system - hormonal control link of the adaptation process [2,10].Changes in hormonal status reflect the degree of training stress in athletes [1,8]. Simultaneous study of testosterone and cortisol in the blood and index calculation anabolic reflect the level of adaptation of the athletes' organism, and its decrease indicates overtraining sportsman [3].

The purpose: the study of the hormonal status of young athletes in the recovery phase of the training cycle.

MATERIALS AND METHODS

The study involved 54 boys, divided into two groups. The first group consisted of 25 young athletes - young men aged 16-17 years old, professional athletes, the amount of training load which is equal to 18 hours a week. The second group (control) included 29 healthy peers not involved in sports.

The studies were conducted during the recovery phase of the annual training cycle athletes on the basis of the Center of Sports Medicine and Rehabilitation of the State budget institutions of the Republic of Sakha (Yakutia), high school of sports. Blood collection was carried out in the rest of the veins in the morning from 8:00 to 9:00 am. The level of testosterone and cortisol were determined on automated photometric analyzer immunofluorescence ChemWell ELISA manufacturing Awareness Technology, Inc. (USA).

According to the results was calculated anabolism index (AI) according to the formula IA = testosterone / cortisol x 100, expressed as a percentage. Reducing the value of IA below 3% was seen as a state of overtraining [12]. We estimated the psychological status of young men. Assessing the level of anxiety of young men was carried out using a methodology for determining the level of reactive and personal anxiety, the proposed C.D. Spilberger, adapted and standardized YL Khanin [11].

To determine the resistance to stress using a technique such as perceptual evaluation of stress [6].

Statistical analysis was performed using the application package SPSS Statistica.19.0. For the statistical analysis of the data were used nonparametric Mann-Whitney and Kruskal-Wallis test for independent samples with a 95% confidence level ($p < 0.05$). Young athletes and their peers not involved in sports, participated in the study on a voluntary basis. It provided written informed consent from the subjects.

RESULTS AND DISCUSSION

Our results show that athletes, even at rest, there are differences in the average values of concentrations in blood testosterone, cortisol, and thus anabolism index, in contrast to their peers who did not participate in sports. Analysis of the data showed the index of anabolic no significant differences between the study groups (Figure 1), however there is a tendency to reduce this figure by 6.8% in athletes with respect to non-athletes. It should be noted that the majority of athletes anabolic index 56.3% is in the range of less than 5, in 12.3% of subjects IA was below 3, indicating that the prevalence of catabolic over anabolic processes and is considered by us as a sign of overtraining.

At the same time it sets a significantly higher concentration of testosterone ($p < 0.001$) in athletes with respect to youths not involved in sports by 33.7% ($p < 0.001$), due to its anabolic effect on the synthesis of contractile proteins in the muscles during exercise compensatory and start the process of stimulation releasing factor, thus accelerating the synthesis of testosterone (Figure 3). Cortisol levels in athletes also significantly higher than that of the non-athletes at 39.5%, which is a response to systematic physical activity, which is a daily action of stress factor that stimulates the production of cortisol (Figure 2).

The study athletes and non-athletes in the level of hormones were divided into 3 groups: 1) high cortisol levels over 700 ng / ml; 2) average cortisol level of 350-700 ng / ml; 3) low cortisol levels - less than 350 ng / ml. As a result, high levels of cortisol, no one has been registered, the average level of cortisol was detected in 58.3% of the athletes compared with 4.9% among young men not involved in sports ($p = 0.001$).

Increased cortisol levels corresponding to chronic physiological and psychological stress. But in the study of the psychological status of young men found that the level of cortisol, testosterone also affects the degree of anxiety. Thus, if raising the reactive anxiety occurs fairly significant increase in cortisol levels ($p = 0.004$) and testosterone ($p = 0.026$). Increased personal anxiety also increases the concentration of these hormones, however, the results have statistical significance (Picture 4.5).

It should be noted that increasing the level of cortisol reflects training stress in athletes, thereby developing them resistant to stresses. The results indicate that the majority of athletes (64.6%) belongs to the stress resistance type B ($p = 0.001$), people of this type clearly define their goals, seek to cope with the difficulties themselves, can work for a long time with great exertion. [6]. These results indicate that elite sport is mobilizing human and develops resistance to stress (Figure 7).

CONCLUSIONS

In 56.3% of subjects athletes prevails catabolic metabolism, including 12.3 percent of them are in a state of overtraining. Athletes set higher levels of cortisol ($p < 0.001$) and testosterone ($p < 0.001$) than in non-athletes. With increasing degree of reactive anxiety significantly increased cortisol levels ($p = 0.004$) and testosterone ($p = 0.026$). Most athletes (64.6%) are stress resistance- ($p = 0.001$) types of people.

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