

# INVESTIGATION OF THE EFFECTS OF CORTISOL ON THE FUNCTIONAL STATUS OF ATHLETES AND DEVELOPMENT OF PHYSIOLOGICAL APPROACHES TO REDUCE ITS NEGATIVE EFFECT

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## Background:

Cortisol is one of the main stress hormones involved in metabolic adaptation during physical activity. Although short-term elevation of cortisol may provide protective effects, prolonged increases can negatively affect athlete health and performance. High cortisol concentrations may contribute to reduced muscle mass, decreased endurance, increased blood glucose levels, and greater risk of metabolic disturbances. Therefore, studying changes in cortisol concentration and methods to reduce its negative effects is important for improving athletes' functional condition and sports performance.

## Objective:

Cortisol values were higher in athletes compared with non-athlete participants. Morning cortisol levels in non-athletes were  $367.5 \pm 6.1$  nmol/l, while weightlifters and football players demonstrated values of  $513.4 \pm 5.9$  nmol/l and  $603.44 \pm 5.7$  nmol/l respectively.

## Materials and Methods:

The study included 35 weightlifting athletes, 35 football athletes, and 30 non-athlete participants aged 17–21 years. Venous blood and urine samples were collected from all participants. Initial blood samples were obtained at 08:00 AM in a fasting state, and additional blood and urine samples were collected at 08:00 PM after high-intensity physical training. Athletes performed approximately 4 hours of daily exercise. Cortisol concentration in blood serum was measured using the IXLT method. The experiment was repeated three times with a 10-day interval, and average values were used for analysis. The research was conducted during training periods and a 14-day rest period.

## Result and Discussion:

Cortisol values were higher in athletes compared with non-athlete participants. Morning cortisol levels in non-athletes were  $367.5 \pm 6.1$  nmol/l, while weightlifters and football players demonstrated values of  $513.4 \pm 5.9$  nmol/l and  $603.44 \pm 5.7$  nmol/l respectively.

The study demonstrated that increased cortisol levels may have both beneficial and harmful effects. Initially, cortisol acts as a protective hormone and provides energy through metabolic processes. However, prolonged elevation may reduce muscle mass and negatively affect athletic performance.

**Conclusion:**

Physical exertion increased cortisol concentrations in athletes and influenced their functional condition. Prolonged elevation of cortisol may negatively affect performance and health status. Monitoring cortisol changes and applying physiological interventions such as sleep regulation, nutritional correction, stress reduction, and recovery methods may help improve athlete health and reduce negative consequences associated with elevated cortisol levels.

**Abstract:**

Alternatively, having too much cortisol in the blood for too long can have serious negative effects. Protein breakdown in tissues, decreased protein synthesis, and reduced conversion of protein to glucose can lead to decreased muscle mass and increased abdominal fat, which can decrease athletic performance, including endurance! Hormonal changes in athletes play an important role during training and competition and may influence endurance, work capacity, and athletic performance. Cortisol is one of the major hormones associated with physical stress and changes during intensive exercise. The purpose of this study was to determine changes in cortisol concentration caused by physical exertion and evaluate its effect on the functional status of athletes, as well as develop methods to reduce its negative effects.

The study involved 35 weightlifting athletes, 35 football athletes, and 30 non-athlete individuals aged 17–21 years. Blood and urine samples were collected before and after intensive physical activity. Venous blood samples were taken at 08:00 in the morning under fasting conditions and analyzed repeatedly during the study period. Cortisol levels were measured before and after exercise, and average values were calculated.

The results showed that physical activity increased cortisol concentration in athletes compared with non-athletes. Football players demonstrated higher cortisol values than weightlifters. Elevated cortisol levels were associated with physical fatigue, sleep disturbances, increased blood glucose levels, and reduced muscle performance. Long-term increases in cortisol concentration may negatively affect athletic condition and endurance.

Several approaches were applied to reduce cortisol levels, including stress reduction, sleep regulation, dietary modification, gradual adaptation to physical load, and ozone therapy. Following these interventions, cortisol indicators showed improvement. These findings emphasize the importance of monitoring cortisol levels in athletes and controlling factors associated with hormonal stress responses.

**Keywords:**

Hormonal changes, Cortisol, Endurance, Sambo, Athlete, Metabolism