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# Study Of The Influence Of Extreme Training On The Physiology Of The Athlete's Urinary

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## Abstract

Physical exercise impacts the physicochemical properties of athletes' urine, such as density, color, and composition. Intense exertion elevates levels of hemoglobin, myoglobin, glucose, ketone bodies, and lactate in urine, while reducing renal blood flow and filtration. These alterations affect urine pH and density, complicating kidney pathology diagnosis and requiring deeper investigation of physiological mechanisms.

**Keywords: -** Physical exercise, hematuria, myoglobinuria, glucosuria, ketonuria, lactate, urine pH, relative density, dehydration.

## Introduction

Physical exercise changes the physical and chemical properties of urine. Urine composition usually returns to normal within 24 hours after training or competition. However, after extreme physical exertion, changes in the urine can persist for a longer period of time - up to 48 or even 72 hours.

The study of athletes' urine is usually carried out less than 24 hours after training, that is, after heavy physical loads, when it is not enough for full recovery.

General analysis of urine allows to determine its relative density, color, transparency, normal and pathological contents of urine. Physiological and biochemical changes can be determined from the urine of athletes after intense physical exertion, active training and any sports competition. These changes depend on the level and size of physical loads.

According to research results, blood supply to the kidneys decreases 5 times or more under intense physical exertion. The resulting hypoxemia and dehydration can lead to a decrease in glomerular filtration, damage to the epithelium of the tubules, resulting in the development of acute kidney failure in some cases.

Hematuria is more common among weightlifters, boxers, football players, and runners. Urine is usually straw yellow and transparent. The red-brown color of urine associated with high physical stress and observation of traumatic myositis in athletes is often associated with the free release of hemoglobin and the entry of muscle pigment myoglobin, and this condition is called myoglobinuria.

Glucose is less common in the urine tested before physical exertion, but the amount of glucose in the urine of athletes is observed after training. This can be due to two main reasons. First of all, as mentioned above, the concentration of glucose in the blood increases during physical exertion, and due to the decrease in the reabsorption function of the kidneys, it remains in the urine. Secondly, as a result of damage to the kidney membrane, the direct reabsorption of glucose in the kidneys is disturbed, which also leads to the development of glucosuria.

Ketone bodies are not detected in the urine before competitions or training. But after training, in the urine of athletes, ketone bodies such as acetoacetic acid and beta-oxybutyric acid are released in large quantities, and acetone, a breakdown product, can also appear. This phenomenon is called ketonuria or acetonuria. This is caused by an increase in the concentration of ketone bodies in the blood and a decrease in the reabsorption function of the kidneys.

The appearance of lactic acid (lactate) in the urine is usually observed after training that involves high-intensity exercise. Each such exercise leads to a sharp increase in the concentration of lactate in the blood and its transfer through the circulation to the urine. This leads to accumulation of lactic acid in the urine. In this regard, by evaluating lactate excretion in urine, it is possible to conclude about the athlete's aerobic capacity and his training.

In addition to physical loads affecting the chemical composition of urine, it also changes its physical and chemical properties.

As a result of the release of lactic acid and ketone bodies in the urine after training, the pH of the urine decreases. If the urine pH is 5-6 with a normal diet before exercise, the urine pH may be in the range of 4-5 after particularly intensive exercise. Also, when the food composition is rich in protein, the urine becomes acidic, and when there are many plant products, it becomes alkaline.

Changes in urinary hyperosmolality and pH create an environment for salt deposition (and excretion) after exercise. The relative density of urine of adult athletes is 1.011-1.025 g/ml. In muscle work, the relative density of urine increases along with the strengthening of the work of the kidneys. After training, it can be 1.030 - 1.035 g/ml and even more.

Thus, the physiological changes of the kidneys due to physical stress and the corresponding changes in the urine are very important, which makes it difficult to diagnose the actual pathological changes in the kidneys of athletes. The origin of these physiological changes in urine is not yet fully understood and requires further study.

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