TRAINING FOR PHYSICAL CONDITIONING OF YOUNG BODYBUILDING ATHLETES

TREINAMENTO PARA O CONDICIONAMENTO FÍSICO DE JOVENS ATLETAS DE MUSCULAÇÃO

ENTRENAMIENTO PARA EL ACONDICIONAMIENTO FÍSICO DE JÓVENES ATLETAS DE CULTURISMO

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ABSTRACT

Introduction: Biochemical indicators such as blood urea nitrogen and creatine kinase in young athletes are ways to test their fitness. These data provide the basis for assessing young athletes' physical and functional fitness during training. Objective: Investigate serum urea nitrogen levels and creatine kinase levels in weightlifters. Methods: 12 biomarkers of athletes were tracked and observed in this article. After this study, it was found that changes were observed in their physiological parameters. These changes are usually found every three weeks. The method of mathematical statistics was used to analyze the data obtained. Results: The average creatine kinase levels were significantly elevated in the first cycle. These data differ from the basal level (P<0.01). The increased serum urea nitrogen and creatine kinase levels indicate that the athlete has entered a state of fatigue. Conclusion: Blood urea nitrogen and creatine kinase levels are essential in determining the degree of fatigue and sports injuries in athletes. ***Level of evidence II; Therapeutic studies - investigation of treatment outcomes.***

Keywords: Weight Lifting Strengthening Program; Athletes; Creatine Kinase; Adolescent; Physical Fitness.

RESUMO

Introdução: Indicadores bioquímicos como nitrogênio ureico no sangue e creatina quinase em atletas jovens são formas de testar a aptidão física. Esses dados fornecem a base para avaliar o condicionamento físico e funcional que os jovens atletas precisam durante o treinamento. Objetivo: Investigar os níveis de nitrogênio sérico ureico e creatina quinase em halterofilistas. Métodos: 12 biomarcadores de atletas foram rastreados e observados neste artigo. Após este estudo, constatou-se que foram observadas mudanças em seus parâmetros fisiológicos. Estas mudanças são geralmente encontradas a cada três semanas. Utilizou-se o método de estatística matemática para analisar os dados obtidos. Resultados: Os níveis médios de creatina quinase foram significativamente elevados no primeiro ciclo. Estes dados são bastante diferentes do nível basal (P<0,01). O aumento do nível sérico de nitrogênio ureico e creatina quinase indica que o atleta entrou em um estado de fadiga. Conclusão: Os níveis de nitrogênio ureico no sangue e creatina quinase têm um papel essencial na determinação do grau de fadiga e lesões esportivas dos atletas. ***Nível de evidência II; Estudos terapêuticos - investigação dos resultados do tratamento.***

Descritores: *Programa de Fortalecimento por Levantamento de Peso; Atletas; Creatina Quinase; Adolescente; Aptidão Física.*

RESUMEN

Introducción: Los indicadores bioquímicos como el nitrógeno ureico en sangre y la creatina quinasa en jóvenes atletas son formas de comprobar su estado físico. Estos datos proporcionan la base para evaluar la aptitud física y funcional que necesitan los jóvenes atletas durante el entrenamiento. Objetivo: Investigar los niveles de nitrógeno ureico sérico y creatina quinasa en levantadores de pesas. Métodos: En este artículo se examinaron y observaron 12 biomarcadores de atletas. Tras este estudio, se observaron cambios en sus parámetros fisiológicos. Estos cambios suelen producirse cada tres semanas. Para analizar los datos obtenidos se utilizó el método de la estadística matemática. Resultados: Los niveles medios de creatina-cinasa fueron significativamente elevados en el primer ciclo. Estos datos son muy diferentes del nivel basal (P<0,01). El aumento de los niveles de nitrógeno ureico sérico y de creatina-cinasa indica que el atleta ha entrado en un estado de fatiga. Conclusión: Los niveles de nitrógeno ureico en sangre y de creatina quinasa tienen un papel esencial en la determinación del grado de fatiga y de las lesiones deportivas en los atletas. ***Nivel de evidencia II; Estudios terapéuticos - investigación de los resultados del tratamiento.***

Descriptores: *Programa de Fortalecimiento Levantando Peso; Atletas; Creatina Quinasa; Adolescente; Aptitud Física.*

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INTRODUCTION

In sports training, the physical fitness of athletes is often analyzed, evaluated, and monitored. These methods are the premise, basis, and essential link of sports training. Whether a scientific evaluation method can correctly analyze and evaluate exercise load and provide real-time feedback and monitoring is essential for scientific training.[1] The amount of exercise load depends on the athlete's response to the exercise load, and the exercise load and the athlete's physiological function are closely linked. They are leaving the exercise loadout to talk about the physical function of the athlete. Sports biochemistry analyzes and studies the changes in human body functions during exercise at the molecular level. The physiological state of athletes during exercise is a stressful state

to load. The biochemical properties of physical exercise have certain commonalities, but they have their characteristics.[2] Physical fitness is a dynamic, aperiodic, and the highest-intensity type of strength. This training is mainly based on acyclic and high-intensity strength. Mainly in the form of non-oxygen to provide energy. This paper detects the content of urea nitrogen and creatine kinase in the blood. These pieces of training provide scientific references for improving their sports level.

METHOD

Subjects and materials

This article selected 12 players to participate in the competition. There were no significant differences in age, height, weight, average years of training, or player class among these athletes.

Methods

The fundamental value determined by the experiment in this paper is 6:30-7:00 in the morning of the first week of the three-week summer training. Athletes evacuated 2 ml of blood in a quiet, awake, fasted condition.[3] Athlete tracking survey for 12 weeks of summer training from June to August 2020. Creatine kinase and blood urea nitrogen in plasma were detected at 3000 r/min.

Reconstruction and simulation of weightlifting movement

The Newton-Gaussian algorithm is suitable for solving nonlinear least-squares problems. Its objective function is in the form of the residual sum of squares, $f(\mu) \leq \sum \lambda_i^2(\mu)$. Let $J = \partial r / \partial \phi$ be the Jacobian matrix of the residual vector function $\lambda = [\lambda_1, \lambda_2, \mathrm{L}, \lambda_M]^T$, then the iterative solution process for solving $\min(f(x))$ is as follows

$$x_{n+1} = x_n + q_n \quad (1)$$

We define the objective function F in the optimization algorithm as a weighted combination of objective functions based on three features

$$M(\phi_t) = y_1 M_o + y_2 M_s + y_3 M_e \quad (2)$$

$\{X_j^{local}, j = 1,2,\cdots, M_i\}_i$ is the local coordinates of all visible points on the surface of the human body under the i camera. M is the number of surface points visible under this camera. $I_{t\text{-}1}$ and I_t are the images acquired by the i camera at time t-1, t, respectively.[4] We define the objective function $F_o(\phi_t)$ as

$$M_o(y) = \sum_{i=1}^{n} \sum_{j=1}^{m} (I_t(y_j^t) - I_{t-1}(y_j^{t-1}))_i^2 \quad (3)$$

Statistical processing

Data are expressed as mean ± standard deviation. The commonly used statistical method in SPSS13. Statistical analysis was performed using a one-sided t-test. There is no need for a code of ethics for this type of study.

RESULTS

Study on serum urea nitrogen and serum creatine kinase levels at different times and stages

From Table 1, it can be seen that the average level of creatine kinase increased significantly in the first cycle.[5] These data were significantly different from baseline comparisons (P<0.01). The average creatine kinase level remained in a state of decline from cycle 2 to cycle 4. There is a big difference (P<0.01) compared with the primary level. In the fourth cycle, the value of creatine kinase was relatively small, indicating that the indicator was well tolerated.

Table 1. Weightlifter Creatine Kinase.

Time	Blood urea nitrogen (mmol/L)	Serum Creatine Kinase (U/L)
Base	5.5±1.18	51.293±16.74
The first cycle	14.993±3.15	510.059±190.14
The second cycle	18.425±2.74	166.298±48.14
The third cycle	17.193±2.95	160.193±48.94
The fourth cycle	14.025±3.01	121.396±30.25

DISCUSSION

The change of blood urea (BUN) can reflect the human body's adaptability to the exercise load. The level of BUN increases in the early stage of training. Still, in the continuous exercise, the athlete's habit of high-intensity exercise will gradually improve, and the athlete's physiological index function will improve. The blood urea level will also decrease; the exercise load adaptability is strong, the recovery ability is strong, and the physical function is good. It is more reasonable for the BUN value to be lower than 8.0 mmol/L the following day.

Conversely, when the weight load increases or physical fitness decreases, the increased concentration of urea in the blood will increase significantly, and the recovery speed will be reduced the following day. The amount of exercise in one training session can be evaluated by blood urea based on the difference between the blood urea before training and after training.[6] The difference between the athletes before and after the heavy exercise is between 1-3-5 mmol/L. When the difference is more significant than three mmol/L, the athlete has reached the critical point of fatigue and own mental state; when the difference is less than one mmol/L, it indicates that the exercise frequency is too small. But at the same time, the fatigue of blood urea should also be considered. When the blood urea is above eight mmol/L, it will reach a state of fatigue. Therefore, after training, if the blood urea level exceeds eight mmol/L or is higher than two mmol/L, it will be regarded as excessive exercise, which is uncomfortable for the body and needs to be reduced. The results showed that the urine urea nitrogen value increased significantly at each stage in the first and second cycles, indicating that the exercise intensity was high in the six weeks before the competition. The physical fitness had not been fully recovered. After three cycles, blood urea nitrogen levels drop and are at their lowest levels in the fourth cycle.[7] During the first six weeks of the summer, the athletes train at high intensity. The blood urea nitrogen levels in the athletes were already far higher than the data recorded in the medical research report, indicating that the athletes did Lots of exercise. In the next training session, the coaches lowered the intensity of the training so that the nitrogen levels in the body were reduced to normal levels.

Weightlifting is a high-intensity intermittent exercise with short completion times and large intervals between each movement; weightlifting focuses on the strength of the exercise, and the number of exercises does not give the athlete's body a noticeable improvement.[8] Therefore, in the training process, it is necessary to reduce the amount of exercise of athletes through improved training methods.

The blood urea nitrogen content reached a high value after six weeks of summer training. After thorough training, the blood urea nitrogen did not exceed this value because later, The recovery situation was better or prepared for the war. The results show that blood urea nitrogen is a sensitive and reliable indicator to measure the weight-lifting load. Six weeks ago, the physical exertion of athletes was high.[9] It is recommended

that, in this case, the coach can perform reasonable exercises on it. However, due to the low training intensity afterward, the blood urea nitrogen content is close to the limit, so it is recommended to carry out an appropriate amount of exercise before the competition.

The current general view is that with the increase of CK activity, the intensity of exercise increases, and with the increase of the adaptation period, its increase will decrease. The results show that: the more significant the increase of CK, the higher the excitement of the muscle tissue; if the body recovers quickly, it means that the body can better withstand the load of training.[10] For high-level players, the recovery of muscle damage is better than that of ordinary players, and the recovery speed of the latter is slower. It is closely related to lean body mass and the type of muscle fibers; CK activity increases at higher ambient temperatures. The exercise intensity should be increased at the beginning and gradually reduced to the usual level. In addition, high-protein foods will cause acidification of fluids in the body, which will increase the load on the liver and kidneys, thereby promoting protein degradation. Therefore, when using the hematuria method to assess exercise load, the effect of a high-protein diet must be considered. It can be seen from Table 1 that the muscle acid kinase value of athletes is very high. Many athletes have endured a lot of high-load and high-intensity exercise in the early exercise training, and their physical fitness has not fully recovered. However, in the second cycle, the test value of the athlete's sarcokinase decreased significantly and returned to its normal state.

Strength is an essential indicator for improving explosive power, and power is an essential indicator for improving explosive power. Weightlifting equipment is usually more extensive, and athletes can move more slowly by pushing against their body weight on larger objects.

Since the rate at which you lift weights can exceed the limit of your body weight, it is difficult to change. The movement done by the weight achieves the desired movement. Exercise at a moderate rate. In the exercise of load-lifting intensity, it can maintain an enormous load under an enormous load. It can improve the nervous system and muscle groups for a certain period without feeling tired.[11] Therefore, when the load increases or is tired when reducing the athlete's intensity, it is necessary to increase the weight consciously. Numerous experiments have shown that after a single damaging pressure exercise for 30 minutes, the ATP-CP value is significantly reduced, and fat deposition occurs. This shows that weightlifting is a sport that uses low oxygen supply as the main driving force. The key is phosphate, so whether, in training or competition, you need to ensure that your energy supply is consistent with the surrounding environmental conditions to achieve better results. Long-term weight-bearing exercise can improve the anaerobic capacity of the human body. Still, its aerobic capacity will be reduced, characterized by: significantly increased ATPase activity, increased CP level, increased muscle glycogen content, CK activity, and LDH activity. Elevated, muscle fibers thickened, muscle fibers increased, and muscle fibers thickened. Therefore, it is necessary to carry out the appropriate aerobic exercise when doing aerobic exercise because aerobic metabolism can help players get rid of fatigue quickly and become the foundation for developing anaerobic ability.

CONCLUSION

The detection of sarcokinase can reflect exercise intensity, thus providing a reference for exercise. The overall value of creatine kinase in the resting state is compared with that of other athletes. Therefore, this paper believes that whether the exercise load can be correctly analyzed and evaluated and whether it can be fed back and monitored in real-time, exercise load depends on the athlete's response to exercise load. This conclusion is also an essential factor in whether training is scientific. Therefore, the exercise load can be increased to achieve the best training results within a certain period. The research in this paper can have a positive significance for the physical training methods of young athletes.

The author declare no potential conflict of interest related to this article

AUTHORS' CONTRIBUTIONS: The author made significant contributions to this manuscript. Lu Gan: writing and performing surgeries; data analysis and performing surgeries; article review and intellectual concept of the article.

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