151 - THE EFFECT OF PHYSICAL TRAINING ON LEVELS OF HEMOGLOBIN IN ATHLETES OF PROFESSIONAL FOOTBALL

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Introduction

The science of the sport has evolved significantly in recent decades. The physical preparation in football is one of the factors that has been most benefited by this development. The scientific knowledge to the football has been of vital importance to the development of training and to the success of a team in a competition.

The football training of today are increasingly focused on the improvement of the physical qualities of the players, who during a match determine a better overall performance of a football player.

Football today is different from what was practiced in the mid-70 and 80. The development of physical preparation has made the game much disputed, not only depending on the technical quality of an athlete or a team, but mainly physical Quality and strength and speed, which are factors that contribute to this new type of football, often called football force.

The growing development of the science of football every day brings new methods and ways of physical training, technical, tactical and psychological, factors that contribute to an improvement in the performance of athletes.

With the growth of scientific research applied to football, technical and physical processors have been working together with fisiologistas, doctors, and other professionals, applying tests, laboratory tests, among other methods, showing results more reliable and giving subsidies to modify and develop new methodologies the training aimed at an improvement in the fitness of athletes.

The human blood is formed by two main components: the plasma and cells. The plasma is the watery portion of blood and contains many ions, proteins and hormones. The cells that form the blood (hematocrit) are the red cells, red blood cells or red blood cells, leukocytes, or white blood cells and platelets. The hematocrit is 45% of the blood composition in humans and 42% in women, depending on factors such as altitude, anemia, among others. The red blood cells contain hemoglobin, which is used for the transport of O2 (oxygen). The leukocytes are fundamental in the prevention of infections and platelets have an important role in blood coagulation. (POWERS and HOWLEY, 2000). The physical training alters the levels of the protein hemoglobin which is present in red blood cells and primarily responsible for transporting oxygen in the body and can lead to a anemia, called anemia of sport. Thus it is appropriate that acting studies demonstrating the relationship between physical training and hemoglobin. Bompa (2005) states that the potential aerobic, or body's ability to produce energy in the presence of oxygen determines the capacity of resistance of the players. The aerobic power is limited by the transport capacity of O2 within the body. Developing the transport system of O2 must be part of any program to improve the capacity of aerobic endurance.

Some studies have examined the profile athletes in blood since the levels of hemoglobin influence the transport of oxygen, and an important factor in physical performance.

Moreover, seeking new scientific knowledge regarding the training of professional athletes in football, the study is to determine the effect of physical training on the levels of hemoglobin in athletes from professional football.

Materials and methods

The sample was composed of 13 athletes from professional football, aged between 19 and 38 years, who participated since the pre-season in February, until the end of the Championship Catarinense the Special Division in June 2006. They were used only the athletes who have made the blood at the beginning and end of the training, which was between February and June 2006.

Instrument for Data Collection

It was used as a tool for collecting data, analyzing blood of the players. The reports of the analysis of peripheral blood cells is offered by the clinical laboratory in a standardized form called complete blood, blood test or simply complete blood. (Zago, Falcon and Pasquini, 2004). To obtain the percentage of fat was used to estimate the Faulkner (1968), and also was performed to assess the body mass index (BMI), Ross (1997).

Tabulation of the Data Analysis and Statistics

For the tabulation of data was used Excel program of Windows XP. In descriptive analysis of the data were analyzed mean ± standard error. To determine whether there were differences between the values pre - and post-training, used - if the T-Student Test with accepted level of significance of $P < 0.05$.

Presentation and discussion of results

In the months of February to June 2006, were conducted the training and games, aiming the Championship Catarinense the Special Division. In the period February to the second fortnight of March, were the pre-season with the athletes, to a better development of physical capabilities to the dispute of the games. In the first weeks of training, emphasis was given to the training of aerobic endurance of athletes, totaling approximately 30 sessions of training with features predominantly aerobic and were held 11 matches by the league.

The 13 athletes who participated in the sample had a mean age of 25 years of age, with an average height of 1.80 m. The average weight of athletes before the start of training was 73,524 kg, decreasing to 73,031 kg after the end of the championship.

It was observed that the athletes had tested a reduction in its percentage of fat of 12.4% (training previous) to 11.2% (post-training), due to training, especially those of aerobic endurance and a feeding controlled. This difference in the percentage of fat in athletes is statistically significant.

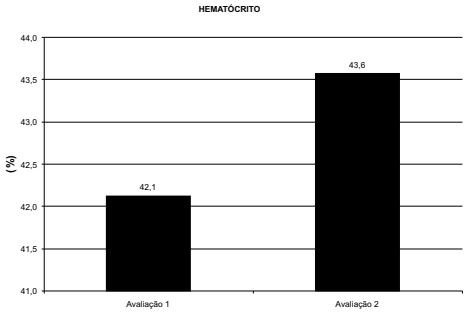
Athletes with a high body weight often have levels of percentage of fat also high, which is not beneficial to the overall performance. Football as a modality that involves the execution of jumps and vertical displacements rapid and repeated, any excess body weight in the form of fat can lead to a decrease in performance.

According Powers and Howley (2000) to exercise more to diet entail a lower loss of lean body mass and, proportionately, greater loss of fat.

	AGE	WEIGHT (Kg)	HEIGHT (m)	% FAT	BMI
Training Previous	25 ± 4,98	73,524 ± 10	1,80 ± 0,09	12,4 ± 2,4	22,7 ± 2,4
Post Training	25 ± 4,99	73,031 ± 8,1	1,80 ± 0,09	11,2 ± 1,49 *	22,6 ± 2,0

*= P <0.05
Mean and SD
Table 1-Profile antropométric of athletes from professional football.

Through blood analysis performed with the athletes during a pre-training (February) and post-training (June), we see a statistically significant increase in levels of hematocrit, from 42,1% in February to 43.6% in June.

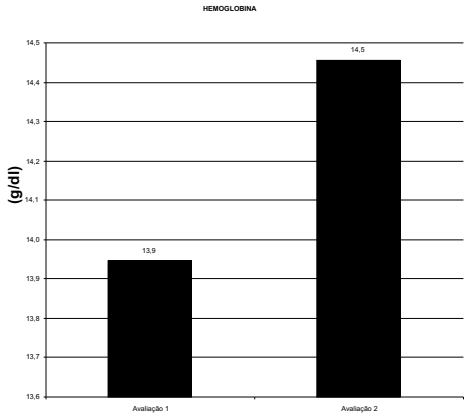


*= P <0.05
Chart 1-Level Red, pre - and post-training athletes in Professional Football.

Fox and colleagues (2000) claim that the red cells account for the largest portion of the cells found in blood. For this reason the hematocrit is influenced above all by increases or decreases the amount of erythrocytes. The increase in the number of red cells causes an increase in the amount of oxygen carried to the tissues.

We also saw this study, the levels of hematocrit increased as a result of aerobic training during the season. Consequently there is also an increase in the levels of red cells due to the displacement of blood plasma for the active muscle cells and interstitial space, in addition to the loss of fluid by sweating, bringing the number of erythrocytes by haemoconcentration.

According to the results of the levels of red blood cells produced by athletes, also saw an increase in the content of hemoglobin by haemoconcentration, because the hemoglobin is contained in erythrocytes. The mean that the first assessment were 13.9 g / dl, came in the second assessment to 14.5 g / dl. The difference of the results and all were statistically significant.



*= P <0.05
Chart 2-Level of Hemoglobin, pre - and post-training in Professional Football Athletes

According Zago, Falcon and Pasquini (2004), hemoglobin, which is 95% of the protein of red blood cells, is responsible for transporting oxygen from the lungs to tissues and carbon dioxide to the lung tissue. The hemoglobin is contained within the red blood cells.

Note that the person that has a good concentration of hemoglobin in the blood, will present an effective system for the transport of oxygen to the muscles in activity and an effective extraction of oxygen from the blood that flows through the muscles active, reaching a rate of oxygen consumption high.

With aerobic training, the concentration of hemoglobin can increase by 5 to 10%, increasing the ability to transport oxygen from the blood, thus improving cardiorespiratory condition of the athlete. (Leite, 2000).

Ebblom and colleagues conducted a study where after transfusion of blood (Pope of RBCs) increased the concentration of hemoglobin in 1.6 g / dl and observed increase, in working time to the physical exhaustion at 23%. Furthermore, we observed a decrease in the concentration of hemoglobin of 1.9 g / dl resulted in the downfall of work to the exhaust, by 29%. (Leite, 2000), this study shows us that high levels of hemoglobin influence in the physical performance of athletes. Meanwhile, athletes participating evidence of resistance, tend to have lower concentrations of hemoglobin because the increase in plasma volume is one of the first adjustments of the body to regular aerobic exercise. (Eichner, 1996).

Athletes, especially those of resistance, have lower levels of hemoglobin in the blood when compared with a normal population. This is due to the increase in the total blood volume, with a greater increase in plasma volume in relation to the total blood volume and consequent decrease dilucional of erythrocyte count per liter of blood. (Maughan; Gleeson and Greenhaff, 2000).

Herlihy and Maebius (2002) claim that components such as iron, vitamin B12, folic acid and protein are essential for the synthesis of hemoglobin.

It is important that athletes have a diet rich in iron, as the inadequate intake of iron, which is the main component of hemoglobin, can lead to a deficiency in their production, thereby interfering in the transport of oxygen to tissues.

As football is a sport that although the duration (90 minutes approximately) involves an interaction between metabolic pathways, it may be a factor for contributing to the increase in the levels of hemoglobin in our study.

Conclusion

In the present study, we use athletes from professional football to look through the blood, the amount of hemoglobin in the blood of athletes, before and after season of training and games, which was between the months of February to June 2006. The values of hemoglobin increased from 13.9 g / dl in February to 14.5 g / dl in the evaluation of June. We checked the effect of physical training on the levels of hemoglobin these athletes and we find that there has been an increase with the hematocrit and erythrocytes. As shown in the reference book of this study, the hematocrit is increased by reason of training, especially for the feature predominantly aerobic, causing changes in blood volume, in addition to the loss of fluid by sweating, bringing the number of blood cells by haemoconcentration. The hematocrit is also influenced by the number of erythrocytes. In training there is a need for more oxygen to the muscles. When is a debt of oxygen in the body due to the training, the kidneys (and to a lesser proportion, the liver) to produce erythropoietin, carried by the blood to the bone marrow that stimulates the release of erythrocytes in the movement, therefore also increases the levels of hemoglobin in the blood, increasing the capacity to transport oxygen and improving the conditioning endurance the athlete.

Due to the availability of time of the athletes, who came on holiday after the end of the championship, it was not possible to the test of aerobic endurance, but we have seen in games and through participation in training and coexistence in the day-to-day, work, which was an improvement in the physical performance of athletes.

Through this study we find that the physical training elevates the levels of hemoglobin in the blood, increasing the ability to transport oxygen to the muscles in activity, improving aerobic capacity during the matches and training.

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THE EFFECT OF PHYSICAL TRAINING ON LEVELS OF HEMOGLOBINA IN ATHLETES OF PROFESSIONAL FOOTBALL

ABSTRACT

The purpose of this study was to verify the effect of physical training on the levels of hemoglobin in athletes from professional football. Advances in the science of exercise have contributed significantly to the improvement in the performance of athletes. To get a good performance in football, we need a system buster well developed, refined through physical training, technical and games. The physical training alters the levels of the protein hemoglobin which is present in red blood cells and the main responsible for transporting oxygen in the body and can take up to an anemia of sport. The sample population and were composed of 13 athletes from professional football, aged between 19 and 38 years, with average age of 25 years. For collections of data was used to analyze blood (blood) achieved by athletes, pre and post the period of training and games, which were held during the season of 4 months. After analyzing the results, there was an increase in the hematocrit, which rose from 42.1% to 43.6%; The levels of hemoglobin, which were 13.9 g / dl and increased to 14.5 g / dl; and the amount of erythrocytes which fell from 4.71 to 4.93 millions /mm3 millions /mm3. From the results, we conclude that the physical training in football elevates the levels of hemoglobin in the blood, improving the transport system and oxygen uptake and the fitness that influences directly on the performance of athletes.

KEYWORDS: football, physical training, hemoglobin.

L'EFFET DE L'ENTRAINEMENT PHYSIQUE SUR LES NIVEAUX DE HEMOGLOBINA DANS ATHLETES DE FOOTBALL PROFESSIONNEL

RESUME

Le but de cette étude était de vérifier l'effet de l'entraînement physique sur les niveaux d'hémoglobine dans athlètes de football professionnel. Les progrès dans la science de l'exercice ont contribué de façon significative à l'amélioration de la performance des athlètes. Pour obtenir une bonne performance dans le football, nous avons besoin d'un système bien développé buster, affinée dans le cadre d'entraînement physique, technique et des jeux. L'entraînement physique modifie les niveaux de la protéine d'hémoglobine, qui est présent dans les globules rouges et les principaux responsables pour le transport de l'oxygène dans le corps et peut prendre jusqu'à une anémie du sport. L'échantillon de population et étaient composées de 13 athlètes de football professionnel, âgés de 19 et 38 ans, avec une moyenne d'âge de 25 ans. Pour les collections de données ont été utilisées pour analyser le sang (sang) obtenus par les athlètes, avant et après la période de formation et de jeux, qui ont eu lieu au cours de la saison de 4 mois. Après avoir analysé les résultats, il ya eu une augmentation de l'hématocrite, qui est passée de 42,1% à 43,6%; Les niveaux d'hémoglobine, qui étaient de 13,9 g de / dL et est passée à 14,5 g / dL; Et Le montant des érythrocytes qui est passé de 4,71 à 4,93 Millions/mm3 Millions /mm3. D'après les résultats, nous concluons que l'entraînement physique dans le football élève les niveaux d'hémoglobine dans le sang, en améliorant le système de transport et d'oxygène et la forme qui influe directement sur les performances des athlètes.

MOTS-CLES: football, entraînement physique, l'hémoglobine.

EL EFECTO DEL ENTRENAMIENTO FÍSICO EN LOS NIVELES DE HEMOGLOBINA EN LOS ATLETAS DEL FÚTBOL PROFESIONAL

RESUMEN

El propósito de este estudio fue comprobar el efecto del entrenamiento físico sobre los niveles de hemoglobina en los atletas de fútbol profesional. Los avances en la ciencia del ejercicio han contribuido de manera significativa a la mejora en el rendimiento de los atletas. Para obtener un buen rendimiento en el fútbol, es necesario romper un sistema bien desarrollado y refinado a través de entrenamiento físico, técnico y juegos. El entrenamiento físico altera los niveles de hemoglobina de la proteína que está presente en los glóbulos rojos y el principal responsable del transporte de oxígeno en el cuerpo y puede tomar hasta un deporte de la anemia. La muestra y la población se compone de 13 atletas de fútbol profesional, de edades comprendidas entre los 19 y 38 años, con un promedio de edad de 25 años. De las colecciones de los datos se utilizó para analizar la sangre (sangre) obtenidos por los atletas, antes y después del período de formación y juegos, que se celebraron durante la temporada de 4 meses. Después de analizar los resultados, hubo un aumento en el hematocrito, que pasó de 42,1% a 43,6%; Los niveles de hemoglobina, que fueron de 13,9 g de / dl y un aumento de 14,5 g dl Y La cantidad de eritrocitos que pasó de 4,71 a 4,93 milotes/mm3 milotes/mm3. A partir de los resultados, llegamos a la conclusión de que el entrenamiento físico en el fútbol eleva los niveles de hemoglobina en la sangre, mejorar el sistema de transporte de oxígeno y la captación y la aptitud que influye directamente sobre el rendimiento de los atletas.

PALABRAS CLAVE: el fútbol, el entrenamiento físico, la hemoglobina.

O EFEITO DO TREINAMENTO FÍSICO SOBRE OS NÍVEIS DE HEMOGLOBINA EM ATLETAS DE FUTEBOL PROFISSIONAL

RESUMO

O propósito deste estudo foi verificar o efeito do treinamento físico sobre os níveis de hemoglobina em atletas de futebol profissional. Os avanços na ciência do exercício têm contribuído de forma significativa para a melhora no desempenho de atletas. Para se obter um bom desempenho no futebol, é necessário um sistema cardiorrespiratório bem desenvolvido, aperfeiçoado através dos treinamentos físicos, técnicos e jogos. O treinamento físico modifica os níveis de hemoglobina que é a proteína presente nos glóbulos vermelhos e a principal responsável pelo transporte de oxigênio no organismo, podendo levar até uma anemia do desporto. A população e amostra foram compostas por 13 atletas de futebol da categoria profissional, com idades entre 19 e 38 anos, com idade média de 25 anos. Para coletas de dados foi utilizada a analise sangüínea (hemograma) realizado pelos atletas, pré e pós o período de treinamentos e jogos, que foram realizados durante a temporada de 4 meses. Após a análise dos resultados, observou-se um aumento no hematócrito, que passou de 42,1% para 43,6%; os níveis de hemoglobina, que eram de 13,9 g/dl e aumentou para 14,5 g/dl; e na quantidade de eritrócitos que passou de 4,71 milhões/mm3 para 4,93 milhões/mm3. A partir dos resultados obtidos, pudemos concluir que o treinamento físico no futebol eleva os níveis de hemoglobina no sangue, melhorando o sistema de transporte e captação de oxigênio e o condicionamento físico que influencia diretamente no rendimento dos atletas.

PALAVRAS CHAVES: futebol, treinamento físico, hemoglobina.