48 - PERCENTAGE OF FAT AND MAXIMUM OXYGEN CONSUMPTION: AN ASSOCIATION OF PHYSICAL FITNESS VARIABLES OF SOCCER PLAYERS

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INTRODUCTION

A great number of people look for specialized physical assessment and therefore can rely on the Project "Functional Assessment for the Community", developed by the Laboratory of Health and Physical Activities (LAFISA) of the University of Santa Cruz do Sul (UNISC), implemented for the care of different populations. Among the users of this project there are soccer players, who are the objects of this study, and for who it is essential to identify the physical fitness related to performance. Functional assessment, especially in this population, allows the organization of the training process, aiming to condition the athletes to a fitness set consistent with the practice of soccer during the competitive periods (TEIXEIRA et al., 1999).

Soccer is a complex activity and demands many physical, motor and psychic skills as well as technical and tactical abilities. For Ribeiro (2011), the results of a match can be determined by the degree of conditioning of the athletes, highlighting the importance of physical conditioning in Professional teams. On the other hand, as noted by Rosa (2011), it is not only during the match that this conditioning is an important athletic differential but also during the recovery period of the players.

One measure that has been being widely used to evaluate the performance of soccer players is the maximum oxygen consumption (VO2max), which is the ability of the individual to capture, transport and use the oxygen at the cellular level during the contraction of the muscles (DENADAI,1999).

In order to assess the cardiorespiratory capacity, cardiopulmonary exercise tests are done and they allow the determination of maximum oxygen consumption (VO2max) one of the most studied variables in soccer (CAMPEIS, 2004). Studies show that significant improvements of aerobic metabolism of players positively affect their physical and tactical performance (CASTAGNA et al., 2011 cited in CAMPOS et al., 2013), evincing the importance to optimize this metabolic pathway.

Every year greater are the physical demands to which the athletes are subjected to due to the sports they practice, which is why the physical trainers and physiologists seek for for physical trainings that lead to the evolution of the different abilities, so that the athletes reach the pinnacle of physical conditioning with great capacity of oxygen consumption and low body fat index.

In this sense, cardiorespiratory fitness has become very important in the world of soccer, especially for professional players, where the tight schedule with many games and little recovery time requires players increasingly well prepared (BINS, 2006). The maximum treadmill test has been considered the best method to evaluate the VO2max. of soccer players, because by increasing the intensity of the test it also increases the oxygen consumption causing their aerobic limit to reach its maximum (LEITE,1986).

Another very observed and studied aspect of soccer players is body fat which in high levels can bring problems for the physical conditioning of the players. Besides the physical, technical, tactical a psychological variables, the anthropometric analyzes are also essential for the improvement of sports performance (VIANA et al., 1987 cited in PANCOTTO JR et al., 2010). Players need to make fast and accurate movements and any excess of body weight in the form of fat can lead to a loss in performance (CAMPEIZ et al., 2004).

Given the exposed issues, the present study aims to correlate the percentage of body fat (%BF) and the maximum oxygen consumption (VO2max) of soccer players of two teams from the countryside of Rio Grande do Sul who compete for series A and B of the state championship, professional category.

METHODOLOGY

This study evaluated 55 male subjects of different tactical positions of two soccer teams from the countryside of Rio Grande do Sul state, in the initial phase of the championship. One of the teams was from the first division of the state championship (Group A), and had evaluated 30 athletes with average age of 24.10 ±4.9 years and the other team was from the second division (Group B), 25 athletes with average age of 24.36±5.20 years. These players were rated for body fat percentage (%BF) using the predictive equation of Jackson and Pollock of seven skinfolds. They were also submitted to cardiopulmonary exercise test by the Protocol of Bruce, on a treadmill coupled to the gas analyzer VO2000, using the classification tables of Heyward (2004). For data analysis were used descriptive statistics with mean and standard deviation to characterize the group evaluated, and the correlation test of Pearson to correlate the variables, by the statistical package SPSS for Windows, version 20.0, considering the level of significance $p<0.05$.

RESULTS

It is observed in Table 1 the result for body fat percentage (%BF) and maximum oxygen consumption (VO2max) of groups A and B. In group A is verified the reduced number of subjects with %BF and VO2max considered excellent, classification obtained by only one subject. The vast majority of athletes was rated as good or regular for VO2max (49.9%), and excellent and good for %BF (90%). The results for group B show the most subjects were rated as regular or weak for the VO2max (76%) variable, while regarding the %BF the most frequent results were "good" and "regular" (56%).

Table1: Results for Maximum Oxygen Consumption (VO2max) and fat percentage (%BF)

Variables	% Fat	Excellent	Good	Ab.Aver.	Aver.	Bel. Aver.	Total n(%)
VO_{2max} Team A	Excellent	1	-	-	-	-	1(3.3)
	Good	7	7	-	-	-	14(46.6)
	Regular	4	4	-	-	-	8(26.7)
	Weak	1	3	3	-	-	7(23.4)
	Very Weak	-	-	-	-	-	-
	Total	13(43.3)	14(46.7)	3(10.0)	-	-	30(100.0)
VO_{2max} Team B	Excellent	-	-	-	-	-	-
	Good	-	3	2	-	-	5(20.0)
	Regular	2	4	-	3	-	9(36.0)
	Weak	3	2	-	3	2	10(40.0)
	Very Weak	-	1	-	-	-	1(4.0)
	Total	5(20.0)	10(40.0)	2(8.0)	6(24.0)	2(8.0)	25(100.0)

-: Representation of value zero. Ab.Aver.= Above average; Aver.= Average; Bel. Aver.= Below Average

The results in Table 2 indicate a correlation between the %BF and VO2max, for both groups evaluated. It is observed a negative correlation, therefore inverse, for both teams A and B, classified as regular, indicating that high percentages of fat correspond to low cardiorespiratory fitness.

	Team	$VO_{2max.}$	
%BF	A	Correlation	-,475
		Significance	,008
		nº	30
		Age	24.9(±4.86)
	B	Correlation	-,449
		Significance	,028
		nº	25
		Age	24.36(±5.20)

Despite the differences in physical fitness regarding to %BF and VO2max found in both studied teams, there was a regular association between low indexes of body fat and high values of maximum oxygen consumption in both teams.

DISCUSSION

According to the results found in this study it was possible to identify that the athletes are below the necessary VO2max for a good athletic performance. This might be due to the fact that these assessments were done at the beginning of the season and the athletes had recently come back from vacation. According to Teixeira et al. (1999), the pre-season is a previous phase of fundamental importance in the planning because it allows starting the necessary functional adaptations to cope with the efforts the competitions are going to demand, reaching a greater performance. Thus, from the results obtained with this study, it is possible to intervene to reduce the %BF, increasing the VO2max and improving the performance of the athletes.

Some physiological parameters are of great importance to classify level of functional capacity in soccer players and among them is the maximum oxygen consumption (SILVA et al., 1999). The physical and cardiorespiratory condition of the players of any Sport is one of the factors that influence in performance as well as in the result of the competitions. Professional soccer players need a well developed aerobic system to properly sustain the actions of the game (CAMPOS et al., 2013). According to Ekblom (1986) cited in Lima (2005), even not being a determinant factor, the aerobic conditioning strongly influences the performance and competitive level of the teams.

The percentage of fat directly influences the performance of the players and is related to the tactical position they occupy. Pancotto Jr et al. (2010) found that goalkeepers are the ones with higher percentage of fat when compared to the other positions, being the lowest percentage observed in the right and left backs. This way it is considered that players who need to perform fast shifting must present less body fat and therefore it is essential that the %BF is found within the recommended range for a good performance.

Wilmore and Costill (1987) report in their study that the values considered great for soccer players are difficult to define, but that excellent results vary in a range from 7 to 12%. Analyzing the results of %Fat of team A, it is possible to see that just a minority shows percentages considered as “excellent” (3.3%) and “good” (46.6%). For team B the same result was observed, whereas the number of players with inadequate %Fat is much higher (80% classified as “regular”, “weak” and “very weak”).

When correlating the percentage of fat to other variables of physical performance in the tests applied, such as VO2max., maximum speed, speed at anaerobic threshold and distance in the test Yo-Yo, Osiecki et al. (2007) did not find significant values different from the findings of this study. However, Santos et al. (2007), when relating the values obtained by indirect tests of VO2max. to the values obtained from the Body Mass Index (BMI), percentage of fat and fat mass (kg), found a correlation in all variables, indicating that the lower the values previously mentioned the better the performance of the athlete in the test for VO2max. Also, another study with anthropometric variables in athletes showed that height and weight are important factors in the performance of soccer players (REILLY, 2000), which was confirmed by PANCOTTO JR et al. (2010), finding and inverse relationship between the oxygen consumption and the fat percentage.

Thus it is highlighted the need for further research to create a more complete database, with a larger number of subjects, enabling a greater understanding on this subject and allowing adequate interventions in order to increase the performance of the athletes.

CONCLUSION

The results showed an inverse relationship between the variable analyzed (%BF and VO2max), indicating that the higher the values of %BF the lower the values of VO2max presented by the athletes of both teams.

Notwithstanding the differences in physical fitness between the teams, it was identified in both groups a relationship between the variables analyzed, highlighting the influence of body fat in the cardiorespiratory capacity.

From this finding, it can be assumed that the higher the body composition smaller may be the performance during the match. Nevertheless, this statement needs further studies involving other technical, tactical and physical variables related to the practice of soccer.

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PERCENTAGE OF FAT AND MAXIMUM OXYGEN CONSUMPTION: AN ASSOCIATION OF PHYSICAL FITNESS VARIABLES OF SOCCER PLAYERS

ABSTRACT

The percentage of fat (%BF) and the maximum oxygen consumption (VO2max) are presented as important variables to be highlighted mainly in soccer players, since the levels of physical fitness might influence in a faster recovery of intense exercise characteristic of the game. Given these issues,, the present study aims to analyze the correlation of %BF and VO2max of soccer players of two teams in the countryside of Rio Grande do Sul, who competed in the series A and B of the state championship, professional category. It is a comparative cross-sectional study conducted with users of the "Functional Assessment for the Community", project in the Laboratory of Health and Physical Activities (LAFISA). Were evaluated 55 male athletes with average age of 24.9 ±4.9 years, of different positions in soccer, divided in two groups: A and B, respectively to the series they were competing. The variables assessed were: %BF through the predictive equation of Jackson and Pollock, using seven skinfolds; VO2max obtained with an incremental stress test done by the Bruce protocol, on a treadmill using a gas analyzer VO2000. The data was tabulated and analyzed using the program Statistical Package for Social Sciences for Windows (SPSS – version 20.0), through descriptive statistics and the correlation test Pearson, considering $p \leq 0.05$. The results showed a regular and inverse relationship between the variables analyzed (%BF and VO2max), for both evaluated teams (A: r= -,475; B: r=-,0425), indicating that the higher the values of %BF, lower were the values for VO2max. Despite these differences, for both groups it was identified the relationship between the variables analyzed indicating the importance of the influence of body fat in cardiorespiratory capacity.

KEY WORDS: body composition, oxygen consumption, soccer athletes.

POURCENTAGE DE GRAISSE ET CONSOMMATION MAXIMUM D'OXYGÈNE: UNE ASSOCIATION DE VARIABLES DE LA CONDITION PHYSIQUE DES JOUEURS DE FOOTBALL

RÉSUMÉ

Le pourcentage de matière grasse (% MG) et la consommation maximale d'oxygène (VO2max) se présentent comme des variables importantes qui doivent être mises en évidence principalement chez les footballeurs, une fois que les niveaux de la condition physique peut influencer le rétablissement rapide de l'effort intense, des caractéristiques du jeu. Compte tenu de ces questions, la présente étude a eu comme but d' analyser la corrélation %G avec le VO2 max de joueurs de football de deux équipes de l'intérieur du Rio Grande do Sul, qui ont participé à des séries A et B du championnat de l' État, catégorie professionnelle . Il s'agit d'une étude transversale, comparative, effectuée avec les utilisateurs du projet « L'évaluation

fonctionnelle pour la communauté », développé au Laboratoire de l'activité physique et la santé (LAFISA) . Nous avons évalué 55 athlètes du sexe masculin ,âgés entre 24,9 ans ± 4,9 ans à des postes différents dans le football , divisés en deux groupes: A et B, respectivement , à des séries qui étaient en compétition . Les variables évaluées sont les suivantes: % G par l'équation de prédiction de Jackson et Pollock, en utilisant sept plis cutanés ; VO2max obtenu par le test supplémentaire d'effort par le protocole de Bruce, le tapis roulant , en utilisant un analyseur de gaz VO2000. Les données ont été compilées et analysées en utilisant le Statistical Package du programme des Sciences Sociales pour Windows (SPSS - Version 20.0), à travers des statistiques descriptives et des tests de corrélation de Pearson , compte tenu de $p \leq 0,05$. Les résultats ont montré une relation inverse et régulière entre les variables analysées (%G et VO2max) dans les deux équipes qui ont été évaluées (A: r = - , 475 ; B: r = - , 0425) , indiquant que plus sont élevées les valeurs de G %, moins sont les valeurs de VO2max . Malgré ces différences, dans les deux groupes a été identifié la relation entre les variables analysées , ce qui indique l'importance de l' influence de la graisse du corps dans la capacité cardiorespiratoire.

MOTS-CLÉS: composition corporelle, consommation d'oxygène, football.

PORCENTAJE DE GRASA Y CONSUMO MÁXIMO DE OXÍGENO: UNA ASOCIACIÓN DE VARIABLES DE APTITUD FÍSICA DE ATLETAS DE FÚTBOL

RESUMEN

El porcentaje de grasa (%G) y el consumo máximo de oxígeno (VO2máx) se presentan como variables importantes para estudio principalmente en atletas de fútbol. Los niveles de aptitud física pueden tener influencia en la recuperación más rápida de los esfuerzos intensos, característicos del juego. Ante estas cuestiones, el presente estudio tuvo como objetivo analizar la correlación del %G con el VO2máx de jugadores de fútbol de dos equipos del interior de Rio Grande do Sul, provincia de Brasil, que disputaron las series A y B del campeonato provincial, categoría profesional. Se trata de un estudio transversal, comparativo, realizado con parte de los usuarios del proyecto “Evaluación funcional para la comunidad”, desarrollado en el Laboratorio de Actividad Física y Salud (LAFISA). Fueron evaluados 55 atletas del sexo masculino, con edad promedio de 24,9±4,9 años, de diferentes posiciones en el fútbol, divididos en dos grupos: A y B, respectivamente a las series que estaban disputando. Las variables evaluadas fueron: %G a través de la ecuación predictiva de Jackson y Pollock, utilizando siete pliegues cutáneos; VO2máx obtenido por teste incremental de esfuerzo por el protocolo de Bruce, en cinta caminadora, con el uso de analizador de gases VO2000. Los datos fueron tabulados y analizados utilizando el programa Statistical Package for Social Sciences for Windows (SPSS – versión 20.0), a través de estadística descriptiva y teste de correlación de Pearson, considerando $p \leq 0,05$. Los resultados apuntaron una relación inversa y regular entre las variables analizadas (%G y VO2máx), en ambos equipos evaluados (A: r= -0,475; B: r=-0,0425), indicando que cuanto mayores los valores de %G menores los valores de VO2máx. Sin embargo, en ambos grupos se identificó la relación entre las variables analizadas, indicando la influencia de la grasa corporal en la capacidad cardiorrespiratoria.

PALABRAS-CLAVE: porcentaje de grasa; consumo de oxígeno; fútbol.

PERCENTUAL DE GORDURA E CONSUMO MÁXIMO DE OXIGÊNIO: UMA ASSOCIAÇÃO DE VARIÁVEIS DE APTIDÃO FÍSICA DE ATLETAS DE FUTEBOL

RESUMO

O percentual de gordura (%G) e o consumo máximo de oxigênio (VO2máx) se apresentam como variáveis importantes de serem destacadas principalmente em atletas de futebol, uma vez que os níveis de aptidão física podem ter influência na recuperação mais rápida dos esforços intensos, característicos do jogo. Diante destas questões, o presente estudo teve como objetivo analisar a correlação %G com o VO2máx de jogadores de futebol de duas equipes do interior do Rio Grande do Sul, que disputaram as séries A e B do campeonato estadual, categoria profissional. Trata-se de um estudo transversal, comparativo, realizado com parte dos usuários do projeto “Avaliação funcional para a comunidade”, desenvolvido no Laboratório de Atividade Física e Saúde (LAFISA). Foram avaliados 55 atletas do sexo masculino, com idade média de 24,9 ±4,9 anos, de diferentes posições no futebol, divididos em dois grupos: A e B, respectivamente às séries que estavam disputando. As variáveis avaliadas foram: %G através de equação preditiva de Jackson e Pollock, utilizando sete dobras cutâneas; VO2máx obtido por teste incremental de esforço pelo protocolo de Bruce, em esteira ergométrica, com o uso de analisador de gases VO2000. Os dados foram tabulados e analisados utilizando o programa Statistical Package for Social Sciences for Windows (SPSS – versão 20.0), através de estatística descritiva e teste de correlação de Pearson, considerando $p \leq 0,05$. Os resultados apontaram uma relação inversa e regular entre as variáveis analisadas (%G e VO2máx), em ambas equipes avaliadas (A: r= -,475; B: r=-,0425), indicando que quanto maior os valores de %G menor os valores de VO2máx. Não obstante essas diferenças, em ambos os grupos foi identificada a relação entre as variáveis analisadas, indicando a importância da influência da gordura corporal na capacidade cardiorrespiratória.

PALAVRAS-CHAVE: composição corporal, consumo de oxigênio, futebol.