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Values of the resistance of the university football player in special conditions, of the city of Manizales (Colombia)

Valores de la resistencia del jugador de futbol universitario en condiciones especiales, de la ciudad de Manizales (Colombia)

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Summary. One of the great interests that has emerged in recent times is that of assessing athletes in the levels related to fitness; to make such assessments have been used conventional tests, which is why it is necessary to carry out a study that evaluates and allows to determine the level of classification of resistance of the football player. In our case, university footballers, using for this the test for the control of the physical condition of the soccer player in special conditions, which clearly and precisely demonstrates the particular characteristics of the athlete, assumed from the sport itself. Method: The target population was 101 male players representing each of the universities in the city and were competing in the phase established by Ascundeportes. (Colombian Association of Universities). Sampling was established for convenience using a non-probabilistic design and for this; the voluntary participation of athletes was obtained. Results**:** mean age was 21.78 +/- 2636 years. In the highest percentage between 21 and 24 years, they are in the first four semesters of undergraduate. The vast majority refers to having practiced the sport of football for 10 years or more, the practice frequency is 3 times a week. As for the game positions, there is a greater number of fliers. Conclusions: The aerobic and anaerobic glycolytic resistance of the evaluated ones shows that the athletes are in a normal level according to the established classification, being found correlations between the aerobic resistance and the age, the frequency of practice and play position and the anaerobic resistance and age.
Keywords. Soccer, Physical Fitness, Classification

Resumen. Uno de los grandes intereses que ha surgido en los últimos tiempos, es el de valorar a los deportistas en los niveles relacionados con la condición física; para realizar dichas valoraciones se han utilizado pruebas convencionales, por lo cual es necesario realizar un estudio que evalúe y permita determinar el nivel de clasificación de la resistencia del jugador de fútbol. En nuestro caso, futbolistas universitarios; utilizando para ello el test para el control de la condición física del jugador de fútbol en condiciones especiales el cual evidencia de forma clara y precisa las características particulares del deportista, asumidas desde el propio deporte. Método: La población objeto, fueron 101 futbolistas de género masculino que representaban a cada una de las universidades de la ciudad y que se encontraban compitiendo en la fase establecida por Ascundeportes. (Asociación Colombiana de Universidades). El muestreo se estableció por conveniencia empleando un diseño no probabilístico y para ello se obtuvo la participación voluntaria de los deportistas. Resultados: La media de la edad fue de 21,78 +/ 2,636 años. En mayor porcentaje entre 21 y 24 años, se encuentran en los primeros cuatro semestres de pregrado. La gran mayoría refiere haber practicado el deporte del fútbol por 10 años o más, la frecuencia de práctica es de 3 veces a la semana. En cuanto a las posiciones de juego se observa un mayor número de volantes. Conclusiones: La resistencia aeróbica y anaeróbica glicolítica de los evaluados, muestra que los deportistas se encuentran en un nivel normal acorde a la clasificación establecida, encontrándose correlaciones entre la resistencia aeróbica y la edad, la frecuencia de práctica y posición de juego y la resistencia anaeróbica y la edad.
Palabras Clave: Fútbol, Aptitud Física, Clasificación.

Introduction

Football is one of the most popular sports of all time in the world, possibly because it is a sport that gives great motor wealth, where physical, technical, spatial, and perceptive abilities play an important role. During the game the players are obliged to perform high intensity exercises mixed with periods of low intensity, performing activities such as jogging, running, kicking, turning in direction, throwing and staying in stop. These exercises require physiological demands and require that players be competent in various aspects of fitness such as aerobic and anaerobic power, muscle strength, flexibility and agility (Bangsbo, 2002; Ramos, Segovia, & Lopez- Silvarrey, 2006; Alvarez, Martínez, & Lopez- Silvarrey, 2009).

It is important that the player and coach obtain objective information about the players' physical performance to clarify the objectives of the training, the plan and the training programs in the short and long term, provide a progressive feedback and motivate the player to train with greater dedication. This information can be obtained by making an assessment of the physical condition of the players, applying tests to assess and assess the capacity of physical performance. In general, there is no integration in the tests used to control the physical condition, which makes it necessary to apply tests to evaluate the state of preparation of the soccer player, so that the results of the tests provide the information more accurate about the development of those determining capacities in the sports performance, considering in them the own conditions of the sport activity (Alvarez, et al, 2009).

Understanding that football is a sport that demands high levels of effort, especially at university level, and knowing the characteristics of it, it is necessary to assess the physical condition of the college football player in special conditions of the city of Manizales (Colombia).

Material and method

Type of Study

The research was developed under the quantitative approach, carrying out a cross-sectional descriptive study, with a comparative phase.

Population and Sample

The target population was 101 male soccer players who represented each of the city's universities and who were

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competing in the phase established by Ascundeportes. (Colombian Association of Universities). The sampling was established for convenience using a non-probabilistic design and for this the voluntary participation of the athletes was obtained.

Test used

To assess the physical condition of the university football player under special conditions, in this study, the test was used to control the physical condition of the soccer player under special conditions Lanza (2004), which has been validated and used in international contexts, and In order to face the design of specific tests for football, initially sought the analysis of the type of effort that is made in the game, allowing a more accurate view of those physical capabilities that should be subject to control, as well as the systems that provide the necessary energy for these to be manifested in high levels of performance.

The objective of the tests is to measure the resistance of the soccer player to withstand repeated efforts with alactacidal characteristics, the anaerobic glycolytic power of soccer players in special conditions, the aerobic resistance of the soccer player in a variable effort under special conditions (Lanza, 2004).

It is composed of 3 charges with 1 minute rest between them. In the first one there will be a return to the course (210 m.) In a constant time of 80 s. (Approximate speed of 2.8 m / s.) The objective of this first load will be to achieve a first elevation of the FC. In the second one, the circuit described will be covered twice (420 m.), Followed by the third work load, consisting of 3 turns in the circuit (630 m. Distance). In each of the charges, the time needed to travel the distance will be clocked, the timer will start to work after hitting the ball at point A and stopping it after carrying out the corresponding routes for each of the loads. The result of the test shall consist of the sum of the times used in the course of the second and third load.

Running the test: The player is placed at «A», at the signal «Already» preceded by the preventive voice of «Ready» leads the ball at maximum speed to «B» where he «steps» and continues without the ball in direction «C» and «D» at point D start driving the other ball to «E» stepping again and moving without ball to «C» and «A». It is returned uninterruptedly executing the same actions (races and conductions) in the same direction and in the opposite direction (A-C-E-D-C-B-A). The necessary time from the beginning will be clocked until returning to point «A» on the return.

Process

The following procedure was developed, which is in accordance with the proposals of the proposed objectives:

1. Calls to university institutions participating in sporting events in Ascún.

2. Socialization of the research proposal to the institutions involved.

3. Compilation of information through the application of techniques and instruments.

- Application of informed consent.

- Application of the glycolytic anaerobic resistance test, which lasted an average of 50 sec.

- Recovery phase the athletes had an active recovery with a 15-minute balloon.

- Application Aerobic endurance test

- Once the tests were completed, the athletes were informed about the times used in each of the tests.

4. During the information collection phase, the elements used were:

Digital pulse oximeter A3, which did not require calibration during the information collection phase, a Max Electronix brand timer, 20 orange saucers of 10cms in diameter, 4 1mt high flags and 10 Golty touchini soccer balls.

When searching the literature did not find that to compare the results obtained from the athletes evaluated for each of the tests under special conditions in football, for which, the research group decided to use statistical methods that help to compare these results to determine the values for the aerobic and anaerobic glycolytic resistance tests.

Firstly, taking into account that the sample was> 50 people, the Kolmogorov-Smirnov test was carried out, with which it was intended to establish normality in the results of the test times for each of the resistances. For the glycolytic anaerobic resistance test, a significance of 0.20 was obtained, this being> 0.05, therefore, the time used by the evaluated athletes presented a normal distribution (table 1).

Since there were no parameters for the evaluation of the special tests of both aerobic and anaerobic glycolytic power in the university soccer players under special conditions of the city of Manizales, and once the theory was reviewed (Reilly, Williams, Nevill, & Franks, 2000; Lanza, 2004; Ortiz-Pulido, Ortiz-Pulido & Ortiz Pulido, 2018), where the power maximum for the glycolytic anaerobic efforts is reached in a range that oscillates between 30-45 seconds after the start of the exercise, assuming also the average that gave the glycolytic Anaerobic test of 40,116 seconds and once found that there is a normal distribution, the Empirical rule to obtain the ranges that determine the assessment of the physical condition under special conditions in the Zig-Zag (Glycolytic Anaerobic) test, by means of its formula: M ± 1ó. Where M is the mean and ó is the standard deviation.

M ± 1 ó40,116 - 4,681 = 35,43540,116 + 4,681 = 44, 797

Thus, the range that determines the assessment of the physical condition under special conditions of athletes evaluated for anaerobic glycolytic resistance is:

<35,43 = GoodBetween 35,44 and 44, 79 = Normal> 44, 80 = Bad

For the Aerobic resistance the Kolmogorov-Smirnov test showed a significance of 0.006 being <0.05, (table 2), showing that there is abnormality in the data, for which, it is necessary to use the inequality test of Chebyishev (Valencia, Poveda & Escudero, 2012) that helped to determine the minimum portion of values that are to a certain number of standard deviations with respect to the average. It is used mainly to estimate the approximate number of data found in certain areas of the data distribution and that served to determine the aerobic physical condition of athletes and which has the following formula:

[M + K ó]> = [1 - (1 / K2)].

Where we have that M is the mean, K the constant and ó is the standard deviation.

Taking into account the theoretical concepts (Reilly, et al, 2000; Lanza, 2004), in which it is stated that aerobic resistance in physical works is reached when the duration is greater than 3 minutes, it is decided to use in the formula K = 1.5 standard deviations, throwing the following intervals:<= 2.36 = Good; Between 2.37 and 4.49 = Average; > 4.50 = Bad.

Results

As observed in the previous table 3, the total of the participating sample, it was found that the mean age was 21.78 +/- 2.636 years. In greater percentage between 21 and 24 years, they are in the first four semesters of undergraduate. The vast majority refers to having practiced the sport of soccer for 10 years or more, the frequency of practice is 3 times a week. As regards the game positions, a greater number of fliers is observed.Table 4, shows the evaluation according to the time taken in the Aerobic test and the glycolytic Anaerobic test, respectively, finding that in a greater percentage the athletes have an assessment of normal.

It is evident that there is a correlation between aerobic resistance and the variables age, play position and practice frequency per week, whereas anaerobic glycolytic resistance only presents a relationship with age (table 5).

Table 1.
Glycolytic anaerobic resistance time normality test

Test	Kolmogorov-Smirnov (a)		
Anaerobic Resistance	Statistical	Gl	Sig.
Glucolytic	0,065	101	0,200*

Source: Author's own elaboration. *> 0.05

Table 2.
Aerobic resistance normality test

Test	Kolmogorov-Smirnov (a)		
Anaerobic Resistance	Statistical	Gl	Sig.
Glucolytic	0,107	101	0,006

Source: Author's own elaboration

Table 3.
Distribution of the sample according to sociodemographic variables

Variable	Frequency	%
Age		
17-20 years	43	42,6
21-24 years	45	44,6
25-29 years	13	12,9
Position		
Goalkeeper	9	8,9
Defense	35	34,7
Steering wheel	46	45,5
Forward	11	10,9
Semester		
1-4 semester	33	32,7
5-8 semester	44	43,6
9-13 semester	22	21,8
Postgraduate	2	2,0
Practice Frequency		
1 time	1	1,0
2 times	6	5,9
3 times	43	42,6
4 times	37	36,6
5 times	14	13,9
Years Practice		
Less than 1 year	1	1,0
between 1 and 5	24	23,8
between 5 and 10	11	10,9
10 years and over	65	64,4

Source: Author's own elaboration

Table 4.
Evaluation of the aerobic resistance of soccer players in special conditions.

Aerobic Resistance			Anaerobic Resistance		
Valuation	Frequency	Percentage	Rate	Frequency	Percentage
Good	9	8,9 %	Good	19	18,8%
Normal	87	86,1%	Normal	66	65,3%
Bad	5	5%	Bad	16	15,8%
Total	101	100%	Total	101	100%

Source: Author's own elaboration

Table 5.
Correlation between the Aerobic - Anaerobic resistance and study variables and Aerobic resistance Variables Correlation Sig. (Bilateral)

	Variables	Correlation	Sig. (bilateral)
Aerobic Resistence	Age	-0,226*	0,023*
	Position	-0,193*	0,05*
	Frequency of practice per week	-0,248*	0,012*
	IMC	-0,028	0,778
	Years of Practice	0,061	0,544
Anaerobic Resistence Glucolytic	Age	-0,263*	0,008*
	Position	-,159	0,112
	Frequency of practice per week	-,167	0,09
	IMC	-,048	0,636
	Years of Practice	,017	,865

Source: Author's own elaboration. <* 0.05 Bilateral significance

Discussion

Regarding the age in Manizales, the universities that compete in the field of football, usually have players between the ages of 17 and 28, with an average of 21.37 ± 2.60 years, in relation to another study (García-Soidán, & Fernández, 2011) where the Healthy Physical Condition is assessed in Galician university students, presents an average of 22.3 ± 1.6 years, a result similar to that found in the present study.Research carried out in our country, expose similar averages 21.53 ± 3.72 years in professional soccer players in Pereira and 20.2 ± 4.5 years in athletes from Antioquia respectively (Rodríguez & Echegoyen, 2005; Sánchez, Ureña, Salas, Blanco & Araya, 2011). When identifying the anthropometric and physiological characteristics of the Puerto Rican footballers, they report an average age of 18.5 ± 0.5 years, very similar to that found in university athletes in Manizales (Batez, Krsmanovic, Mikalacki, Cokorilo, Simic, & Ruiz-Montero, 2018). Likewise, (Sporis, Jukic, Ostojic & Milanovick, 2009), have an average age of 29 ± 3 years and 24.64 ± 4.35 years footballers data are higher than those of the present study.

It is worth mentioning that for many authors (Slimami, Znazen, Hammami & Bragazzi, 2017), the age of the players does not affect the performance of the same; but it can be suspected, that in the lower ages it is where the correct construction of the basic physical qualities is executed.

Regarding the differences of the competitive level, higher VO2max, average anaerobic power, RSA and speed performance (5 to 20 m), and lower% body fat and explosive capacities of the lower extremities (counter-movement jump (CMJ) and jump squat (SJ)) were found in the outfielders (strikers, midfielders and defenders) compared to the goalkeepers, from a very young age (8 years) (Slimani & Nikolaidis, 2017).

It is worth mentioning that for many authors (Slimami, Znazen, Hammami & Bragazzi, 2017), the age of the players does not affect the performance of the same; but it can be suspected, that in the lower ages it is where the correct construction of the basic physical qualities is executed.It is noteworthy, as in none of the backgrounds with which the discussion is developing, do they show data referring to the frequency and years of practice, but some authors mention that there are adaptations in the organism, when carrying out a systematic, organized training that helps to obtain and improve conditional capacities and their maintenance (Slimami, et al, 2017). According to Reilly, Bangsbo & Franks (2000) the systematic realization of physical activities guarantees excellent levels of health and constitutes the only alternative that can produce this beneficial effect on cardiorespiratory function and in the rest of the organism. It is evident that the vast majority of athletes who have a higher weekly practice level, are in an average and good, with

approximate data, it is clear that the greater number of workouts will be the level of fitness.It is clear that the determination of the shape of the physicist from anthropometric variables is also an important part in the comprehensive evaluation of a player (Cometti, 2002; Torreblanca-Martínez, Cordero-Ojeda, & González-Jurado, 2019) and is in itself an element that can be used for the detection, selection and placement of the athlete in a specific position. In the case of overall sports, such as football, indoor soccer, the position of the game must be considered fundamentally, both for its technical-tactical and physiological requirements, which have been reflected in its general morphology (Manopoulos, Papadopoulos, Manolopoulos, Gissis, Bekris, & Sotiropoulos, 2012). The quantification of aspects such as the morphological constitution present in the soccer player, can lead to a better understanding of the relationship between the constitution and the performance or performance of the athlete during the competition (Carter & Health, 2005; Barber, Granda, & Soto, 2000).

They oscillate between 140-150 beats per minute, when conducting with the adversary's mark can present cardiac frequencies that oscillate between 150-160 beats per minute (Porter, 2004; Cullen, Cregg, Kelly, Hughes, Daly & Moyna, 2013). Being data similar to those of the present study.

Likewise, the competing heart rate oscillates between 160-180 beats per minute, during the competition there is an average of the heart rate with values of 165-170 beats per minute and small variations are observed throughout the game. 160 and 185-190 beats per minute (Cullen, et al, 2013). Frequencies that approach those registered in university athletes.

On the other hand, during a football match the contribution of aerobic energy is 90% of the total energy supply. Even so, the production of anaerobic energy plays a very important role. During the periods of high intensity in the game, phosphocreatine and, to a lesser extent, ATP is used, both compounds being resynthesized in the respective recovery periods (Alvarez, et al, 2009), being of vital importance to classify the athletes at the levels of resistance in which find.

This is how the athletes of university football in special conditions of the city of Manizales, were classified according to the following intervals: for the test of aerobic endurance it was rated as good who was located below 2 minutes 36 seconds, as normal who it will be placed in the range between 2 minutes 37 seconds and 4 minutes and as bad who was more than 4 minutes 50 seconds; for the glycolytic anaerobic resistance test it was classified as good who was located below 35 seconds with 43 thousandths, as normal who was in the range between 35 seconds with 44 thousandths and 44 seconds with 79 thousandths, and as bad who was located higher than 44 seconds with 80 thousandths; When talking about resistance both aerobic and anaerobic, (Reilly, et al, 2000; Lanza, 2004; Pallares, & Morán-Navarro, 2012) two concepts must be taken into account such as capacity and power.

When talking about capacity, reference is made to the total amount of energy that is available in a metabolic pathway and that means the time that an athlete is able to maintain a power of determined effort, and the power refers to the greater amount of energy per unit of time that can be produced through an energy path.

The maximum power for the glycolytic anaerobic works is reached in a range that oscillates between 30-45 seconds after the start of the exercise, classifying this type of exercises as short-term resistance (RCD) and the aerobic resistance in physical works is reached when the duration is greater than 3 minutes and its intensity can be low or medium. According to the sport, the development of the loads that correspond to an intervallic type and to the change of motor forms that are executed in the competition such as the short and explosive speed, running, jumps, throws, among others; This type of resistance can be determined as an acyclic base and that is constituted by constant changes between anaerobic-aláctic, anaerobic-lactic acid and aerobic metabolic situations, where the latter is predominant (Johannes, Van-Beek, Faraniza Supandi, Anand, Gavai, & Hannes, 2011; Vallenilla, & Gamardo, 2012).

In this sense the present study, found as in the assessment of the physical condition of the university football players in special conditions of the city of Manizales and according to the times obtained showed that 86.1% of the football players for the resistance aerobic and 65.3% for anaerobic glycolytic power are in normal scale; being within normal times and ranges, presenting similarity when compared with other authors (Reilly, et al, 2000; Lanza, 2004; Pallares, et al, 2012).It was also found that there is a statistically significant correlation between aerobic endurance with variables such as age, frequency of practice per week and positiok, n of play and anaerobic resistance and age. In this regard, the different studies showed that depending on the position of the game, the performance of the athlete is higher (Mazurek, Krawczy, Zmijewski, Norkowski, & Czajkwska, 2014; Moreno, Ramos, & Parra, 2012; Sporis, et al, 2009; Vaquera, et al, 2007). Unlike another study where significant differences were found in the anaerobic power in favor of the archer vs the other positions (Vaquera, et al, 2007).

Regarding the frequency and time of sports practice, it could be established that this correlation can occur because these variables are endogenous to the training levels of the subjects, a situation that shows how functional capacity is influenced by the increase in age and body fat, where a higher frequency of physical exercise shows a better VO_2 max. and strength, but lower body fat (Mazurek, et al, 2014).

The flyers have the highest values of maximum oxygen consumption with an average of 58.38 ± 9.85 ml / Kg / min and the goalkeepers the lowest values with a VO_2 max. of 55.94 ± 5.78ml / Kg / min. Data that are ratified by Sánchez et al, (2011), then, found that the highest value in the maximum consumption of oxygen is in the hands of the midfielders and the lesser archers.

Likewise, it should be noted that in a study carried out by university football players (Castiblanco, Villa, & Vidarte, 2015), they determine the correlation presented by aerobic and anaerobic resistance with other variables, demonstrating the importance of classifying athletes in resistance levels, taking into account specific in football (Manouvrier, Cassirame & Ahmaidi, 2016; Barbero-Alvarez, Subiela, Granda-Vera, Castagna, Gómez & Del Coso, 2015).

Conclusions

The aerobic and anaerobic glycolytic resistance of the evaluated ones, shows that the athletes are in a normal level according to the established classification, finding correlations between the aerobic resistance and the age, the frequency of practice and position of game and the anaerobic resistance and the age.It is important that the player and the technician obtain objective information about the physical performance of the players to clarify the objectives of the training, applying specific tests for the sport in particular that assess and assess the capacity of physical performance in a specific form.

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