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)

*Jose Armando Vidarte Claros, *Hector David Castiblanco Arroyave, *Jose William Villa Barco, **Arles Javier Ortega Parra
*Universidad Autónoma de Manizales (Colombia), **Universidad de Pamplona (Colombia)

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, 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 futbol. En nuestro caso, futbolistas universitarios; utilizando para ello el test para el control de la condición física del jugador de futbol 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 +/- 2636 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-Silverrey, 2006; Alvarez, Martinez, & Lopez-Silverrey, 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
竞争的阶段由Ascundeportes。哥伦比亚协会的大学生院。该取样方法为方便起见使用非概率设计，因此该免费验证参与者的自愿参与。

**Proceso**

- Aplicación del test de resistencia anaeróbica glicolítica. 

El test se aplicó para evaluar la condición física de los jugadores de fútbol universitarios bajo condiciones especiales (Lanza, 2004), que ha sido validado y utilizado en contextos internacionales, y en orden a la realización de específicos tests para el fútbol, inicialmente buscó la evaluación del tipo de esfuerzo que se realiza en el juego, proporcionando una visión más precisa de las capacidades físicas que deben ser sujetas al control, así como los sistemas que proporcionen la energía necesaria para ser manifestados en altos niveles de rendimiento.

El objetivo de los test es medir la resistencia del jugador de fútbol para resistir repetidos esfuerzos con ácidos lactácidos, la resistencia anaeróbica glicolítica del jugador de fútbol en condiciones especiales, la resistencia anaeróbica del jugador de fútbol en un esfuerzo voluntario bajo condiciones especiales (Lanza, 2004).

El test consiste de 3 cargas con 1 minuto de descanso entre ellas. En la primera uno habrá una vuelta al curso (210 m) en un tiempo constante de 80 s. (Velocidad aproximada de 2.8 m/s). El objetivo de este primer test será alcanzar la primera elevación del FC. En la segunda, el circuito descrito se repetirá dos veces (420 m) a continuación del segundo test de carga, de 3 volantes en el circuito (630 m. Distancia). En cada una de las cargas, el tiempo necesario para llegar a la siguiente será apuntado, el timer comenzará a funcionar después de llegar a la meta inferior y detenerse después de realizar las acciones correspondientes para cada uno de los cargos. El resultado del test se compilará como la suma de los tiempos utilizados en la segunda y tercera carga.

**Running the test:** El jugador es colocado en «A», en el momento del inicio del test el jugador va a valorar el máximo tiempo de carrera a «B» donde se realiza el primer test de carga, el jugador da un primer test de carga de 3 cargas con 1 minuto de descanso después de realizar el primer test de carga de 3 cargas con 1 minuto de descanso. El siguiente test de carga se realizará de forma similar en la misma dirección y en sentido contrario (A-C-E-D-C-B-A). La cuarta carga se realizará en la misma dirección y en sentido opuesto (A-C-E-D-C-B-A). La siguiente carga se realizará como la suma de los tiempos utilizados en la segunda y tercera carga.

**Process**

- Aplicación de consentimiento informado.
- Aplicación del test de resistencia anaeróbica glicolítica.

El test se aplicó para evaluar la condición física de los jugadores de fútbol universitarios bajo condiciones especiales de la ciudad de Manizales, y una vez que la teoría fue revisada (Reilly, Williams, Nevill, & Franks, 2006; Lanza, 2004; Ortiz-Pulido, Ortiz-Pulido & Ortiz Pulido, 2018), se estableció que la resistencia anaeróbica glicolítica se encuentra en un rango que oscila entre 30-45 segundos después del inicio del ejercicio, suponiendo que la media del tiempo de carrera de 40,116 segundos y una vez detectado que existe una normalidad, el rango se puede obtener utilizando la fórmula de Chebyshev (Valencia, Poveda & Escudero, 2012) que ayuda a determinar el mínimo porcentaje de valores a los que se puede aplicar la prueba de resistencia anaeróbica glicolítica: M ± 1 ó = 35,43540,116 ± 4,681 = 44, 797. La media de los test de resistencia anaeróbica glicolítica es: <35,43 = GoodBetween 35,44 and 44,79 = Normal> 44,80 = Bad.

En la prueba de resistencia aérea, el test de resistencia anaeróbica glicolítica mostró una significación de 0.006 (cuadro 2), mostrando que existen abnotabilidades en los datos. Para este test, se utilizó la prueba de Chebyshev (Chebyshev, Valencia, Poveda & Escudero, 2012) que ayudó a determinar el mínimo porcentaje de valores a los que se puede aplicar la prueba de resistencia anaeróbica glicolítica. La prueba se realizó en la ciudad de Manizales, y una vez que la teoría fue revisada (Reilly, Williams, Nevill, & Franks, 2006; Lanza, 2004; Ortiz-Pulido, Ortiz-Pulido & Ortiz Pulido, 2018), se determinó que la resistencia anaeróbica glicolítica se encuentra en un rango que oscila entre 30-45 segundos después del inicio del ejercicio, suponiendo que la media del tiempo de carrera de 40,116 segundos y una vez detectado que existe una normalidad, el rango se puede obtener utilizando la fórmula de Chebyshev (Valencia, Poveda & Escudero, 2012) que ayuda a determinar el mínimo porcentaje de valores a los que se puede aplicar la prueba de resistencia anaeróbica glicolítica: M ± 1 ó = 35,43540,116 ± 4,681 = 44, 797. La media de los test de resistencia anaeróbica glicolítica es: <35,43 = GoodBetween 35,44 and 44,79 = Normal> 44,80 = Bad.

Para la prueba de resistencia anaeróbica glicolítica, el test de resistencia anaeróbica glicolítica mostró una significación de 0.006 (cuadro 2), mostrando que existen abnotabilidades en los datos, para este test, se utilizó la prueba de Chebyshev (Chebyshev, Valencia, Poveda & Escudero, 2012) que ayudó a determinar el mínimo porcentaje de valores a los que se puede aplicar la prueba de resistencia anaeróbica glicolítica. La prueba se realizó en la ciudad de Manizales, y una vez que la teoría fue revisada (Reilly, Williams, Nevill, & Franks, 2006; Lanza, 2004; Ortiz-Pulido, Ortiz-Pulido & Ortiz Pulido, 2018), se determinó que la resistencia anaeróbica glicolítica se encuentra en un rango que oscila entre 30-45 segundos después del inicio del ejercicio, suponiendo que la media del tiempo de carrera de 40,116 segundos y una vez detectado que existe una normalidad, el rango se puede obtener utilizando la fórmula de Chebyshev (Valencia, Poveda & Escudero, 2012) que ayudó a determinar el mínimo porcentaje de valores a los que se puede aplicar la prueba de resistencia anaeróbica glicolítica: M ± 1 ó = 35,43540,116 ± 4,681 = 44, 797. La media de los test de resistencia anaeróbica glicolítica es: <35,43 = GoodBetween 35,44 and 44,79 = Normal> 44,80 = Bad.
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; $2.37 \leq 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 +/- 2.63 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 values of aerobic resistance and the variables age, play position and practice frequency per week, whereas anaerobic glycolylic resistance only presents a relationship with age (table 5).

### 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 $21.37 \pm 2.60$ 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 $22.3 \pm 1.6$ years, a result similar to that found in the present study.

Research carried out in our country, expose similar averages $21.53 \pm 3.72$ years in professional soccer players in Pereira and $20.2 \pm 4.5$ 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 $18.5 \pm 0.5$ years, very similar to that found in university athletes in Manizales (Batez, Krsmanovic, Mikalacki, Cokorilo, Simic, & Ruiz-Montero, 2018). Likewise, (Sporis, Jukie, Ostojic & Milanovic, 2009), have an average age of $29 \pm 3$ years and $24.64 \pm 4.35$ 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

### Table 1. Glucolytic anaerobic resistance time normality test

<table>
<thead>
<tr>
<th>Resistance</th>
<th>Statistical</th>
<th>Glucose</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Good</td>
<td>0.065</td>
<td>101</td>
<td>0.200</td>
</tr>
</tbody>
</table>

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

### Table 2. Aerobic resistance normality test

<table>
<thead>
<tr>
<th>Resistance</th>
<th>Statistical</th>
<th>Glucose</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Good</td>
<td>0.017</td>
<td>101</td>
<td>0.000</td>
</tr>
</tbody>
</table>

Source: Author's own elaboration

### Table 3. Distribution of the sample according to sociodemographic variables

<table>
<thead>
<tr>
<th>Variable</th>
<th>Frequency</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>7-10 years</td>
<td>13</td>
<td>12.9</td>
</tr>
<tr>
<td>11-14 years</td>
<td>22</td>
<td>21.8</td>
</tr>
<tr>
<td>15-18 years</td>
<td>14</td>
<td>13.9</td>
</tr>
<tr>
<td>19-22 years</td>
<td>65</td>
<td>64.4</td>
</tr>
</tbody>
</table>

Source: Author's own elaboration

### Table 4. Distribution of the sample according to sociodemographic variables

<table>
<thead>
<tr>
<th>Practice Frequency</th>
<th>Age</th>
<th>Frequency</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 time</td>
<td>2</td>
<td>1.9</td>
<td></td>
</tr>
<tr>
<td>2 times</td>
<td>1</td>
<td>1.9</td>
<td></td>
</tr>
<tr>
<td>3 times</td>
<td>9</td>
<td>8.9</td>
<td></td>
</tr>
<tr>
<td>4 times</td>
<td>3</td>
<td>2.9</td>
<td></td>
</tr>
<tr>
<td>5 times</td>
<td>7</td>
<td>6.7</td>
<td></td>
</tr>
<tr>
<td>6 times</td>
<td>5</td>
<td>4.9</td>
<td></td>
</tr>
</tbody>
</table>

Source: Author's own elaboration

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

<table>
<thead>
<tr>
<th>Variable</th>
<th>Correlation</th>
<th>Sig. (Bilateral)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>-0.220</td>
<td>0.023*</td>
</tr>
<tr>
<td>Frequency of practice per week</td>
<td>-0.248*</td>
<td>0.012*</td>
</tr>
<tr>
<td>IMC</td>
<td>-0.028</td>
<td>0.778</td>
</tr>
<tr>
<td>Years of Practice</td>
<td>0.064</td>
<td>0.544</td>
</tr>
</tbody>
</table>

Source: Author's own elaboration. * < 0.05 Bilateral significance
and that means the time that an athlete is able to maintain a total amount of energy that is available in a metabolic pathway. (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 (Manolopoulos, 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, Gregg, 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 classified as good who was located below 4 minutes 50 seconds; for the glycolytic anaerobic works it was classified as good who was located below 2 minutes 36 seconds 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.

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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 classified as good who was located below 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 located below 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-lactic, 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 position, 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. 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. max. of 55.94 ± 5.78 ml/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; Barboro-Alvarez, Subiela, Gran-da-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.

Thanks

The authors would like to thank the athletes participating in the study and the Autonomous University of Manizales who financed the realization of the same

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