Revista Andaluza de
Medicina del Deporte
Rev Andal Med Deporte. 2014;7(3):106-10
www.elsevier.es/ramd

Original

ARTÍCULO EN INGLÉS

Physical fitness and anthropometric characteristics in professional soccer players of the United Arab Emirates

M. Magalhães Sales[a,b], R. A. Vieira Browne[c], R. Yukio Asano[d], R. dos Reis Vieira Olher[a], J. F. Vila Nova[d,e], Moraes[e] and H. G. Simões[a].

[a]*Catholic University of Brasília. Universidade católica de Brasília - UCB. Taguatinga, DF. Brazil.*
[b]*UDF - Centro Universitário - UDF. Brasília, DF. Brazil.*
[c]*Universidade Federal do Rio Grande do Norte - UFRN. Natal, RN. Brazil.*
[d]*Universidade de Mogi das Cruzes - UMC. Mogi das Cruzes, SP. Brazil*
[e]*Universidade Federal do Vale do São Francisco - UNIVASF. Petrolina, PE. Brazil.*
[c]*Federal University of Vale do São Francisco. Petrolina, PE. Brazil.*

History of the article:
Received August 25, 2012
Accepted November 28, 2013

Keywords:
Soccer.
Physical fitness.
Ventilatory threshold.
RAST test.
VO_2max.

ABSTRACT

Objective. To describe the anthropometric and physical fitness profiles of elite soccer players acting in the United Arab Emirates.
Method. Twenty seven elite soccer players acting in the United Arab Emirates were underwent to an anthropometric evaluation, an incremental test in treadmill and performed the Running-Based Anaerobic Test (RAST).
Results. Body mass index and body fat percentage of the athletes were 23.1 ± 2.0 kg.m^{-2} 11.6 ± 2.1 %, respectively. Indirect maximum oxygen uptake (VO_2max) was 62.3 ± 5.1 ml.kg^{-1}.min^{-1}, mean velocity at VO_2max was 17.6 ± 1.5 km.h^{-1}, ventilatory threshold (VT) of 13.8 ± 0.8 km.h^{-1}, heart rate at VT of 173.1 ± 8.6 b.min^{-1}, which represents of 91.2 ± 2.8 % of maximum heart rate. RAST resulted in a maximum absolute power of 551.9 ± 73.0 W, maximum relative power of 7.8 ± 0.4 W.kg^{-1}, mean absolute power of 484.0 ± 57.8 W, and mean relative power of 6.8 ± 0.2 W.kg^{-1}.
Conclusion. The anthropometric profile of soccer players that act in the United Arab Emirates is similar to others around the world. However, regarding the physical fitness, results are still inconclusive, since findings from other studies suggest that the anaerobic power of our sample is alike or lower than other elite players throughout the world. Likewise indirect VO_2max, especially given the acknowledged limitations of obtaining indirectly this variable. In addition, making an analysis by playing position, the results of this study are similar to previous research.

Palabras clave:
Fútbol.
Aptitud física.
Umbral ventilatorio.
Test RAST.
$VO_{2máx.}$

RESUMEN

Aptitud física y características antropométricas de jugadores profesionales de fútbol de los Emiratos Árabes Unidos

Objetivo. Describir el perfil antropométrico y la aptitud física de los jugadores de fútbol de élite que trabajan en los Emiratos Árabes Unidos.
Métodos. Veintisiete jugadores de fútbol de élite que trabajan en los Emiratos Árabes Unidos fueron sometidos a una evaluación antropométrica, un test incremental en un tapiz rodante y *Running-Based Anaerobic Test* (RAST).
Resultados. El índice de masa corporal y el porcentaje de grasa fueron 23,1 ± 2,0 kg.m^{-2} y 11,6 ± 2,1 %, respectivamente. El consumo máximo de oxígeno (VO_2máx) estimado fue 62,3 ± 5,1 ml.kg^{-1}.min^{-1}, y la velocidad media de VO_2máx fue 17,6 ± 1,5 km.h^{-1}, y la velocidad media de umbral ventilatorio (UV) fue 13,8 ± 0,8 km.h^{-1}. La frecuencia cardíaca del UV fue en media 173,1 ± 8,6 b.min^{-1}, lo que representa 91,2 ± 2,8 % de la frecuencia cardíaca máxima. El test RAST resultó en una potencia máxima absoluta de 551,9 ± 73,0 W, potencia máxima relativa de 7,8 ± 0,4 W.kg^{-1}, potencia media absoluta de 484,0 ± 7,8 W, y potencia media relativa de 6,8 ± 0,2 W.kg^{-1}.
Conclusión. El perfil antropométrico de los jugadores de fútbol que trabajan en los Emiratos Árabes Unidos es similar a otros del resto del mundo. Sin embargo, en cuanto a la aptitud física, los resultados aún no son concluyentes, porque los resultados de otros estudios sugieren que la potencia anaerobia de nuestra muestra es igual o inferior a la de otros jugadores de élite de todo el mundo. Del mismo modo, el VO2max indirecto no es concluyente, teniendo en cuenta las limitaciones reconocidas de obtener indirectamente esta variable. Finalmente, al analizar los jugadores de acuerdo con a la posición táctica, los resultados de este estudio son similares a los estudios anteriores.

Correspondence:
M. Magalhães Sales.
E-mail: marcelomagalhaessales@gmail.com

INTRODUCTION

Soccer is characterized by acyclic and intermittent actions, such as high intensity sprints, jumps and kicks[1]. Studies have demonstrated that some physical qualities are determinant to performance in soccer[2-3].

Therefore, a significant amount of studies approaching the physical and physiological aspects of professional soccer have been performed. Previous investigations[4–13] have evaluated the anthopometric and physical fitness profiles of professional soccer players in most parts of Europe and America. However, there is still little descriptive data over these characteristics in elite soccer players from the Asian continent, especially in the Arab world. Characteristics such as body composition (body fat percentage and body mass index), anaerobic power (speed), aerobic power (maximum oxygen uptake), aerobic capacity (anaerobic threshold) among other factors are determinant to the development of training and the performance of professional soccer players[1-2,14–18].

Thus, the better understanding of the anthropometric and physical fitness profiles of professional soccer players acting in the United Arab Emirates could provide more information to coaches and physiologists on this specific group of athletes, favoring training and, consequently, the athlete's performance. Hence, the aim of the present study was to describe the anthropometric and physical fitness profiles of elite soccer players acting in the United Arab Emirates.

METHOD

Sample

The present study has a cross-sectional, analytic and descriptive nature in which participated 27 elite soccer players acting in the United Arab Emirates (table 1). All participants were instructed to refrain from physical exercise and not to ingest alcohol or caffeine in the 24 hours that preceded the experimental procedures. After being informed of the risks and benefits of the study and gave a written informed consent, all individuals were submitted to an anthropometric evaluation, an incremental test in a treadmill, and an anaerobic power test in an athletics track. Finally, the sample was divided into five groups as follows: goalkeepers, full backs, sideways, midfield and forwards, for comparison of anthropometric variables (BMI and body fat percentage) and physical fitness (aerobic and anaerobic) between the different groups. All procedures were approved by the ethics committee of University research center UNIRG (process n° 0001/2008).

Anthropometric measurements (body mass index and boy fat percentage)

Body mass index (BMI) was calculated considering the quotient between body mass (Toledo 2096 PP, Brazil) in kilograms, and stature (SECA® 214, USA) in squared meters ($kg.m^{-2}$).

Relative body fat percentage (BF%) was estimated using the skinfold thickness technique, in which body density was calculated using the 7 skinfold thicknesses protocol proposed by Jackson and Pollock[19], measured three times at each point, in a rotational order, on the right side of the body, with the mean value of the measurements being registered. All procedures were performed by a single evaluator using a skinfold caliper (Lange, Cambridge Scientific Instruments, Maryland, USA). Afterwards, body density was converted in BF% using Siri's equation[20].

Table 1
Anthropometric characteristics. Data expressed in mean and (±) standard deviation (n = 27)

Age (years)	Body weight (kg)	Height (cm)	BMI ($kg.m^{-2}$)	Body fat (%)
23.8 ± 4.8	70.8 ± 8.0	175.1 ± 6.4	23.1 ± 2.0	11.6 ± 2.1

BMI:body mass index.

Physical fitness

Running-Based Anaerobic Sprint Test

Determination of anaerobic power was performed using the Running-Based Anaerobic Sprint Test (RAST). The RAST test consisted of six 35 meters maximal runs separated by a period of 10 secs of passive recovery. The recorded time was conducted after every effort by a stop watch (Casio HS-80TW). Power (P), in Watts (W), for each sprint was calculated through the product of body mass (BM), in kilograms (kg), and the distance (35m) raised to the second power. Afterwards, this result was divided by the time of each sprint (T), in seconds (s), raised to the third power.

Registered anaerobic parameters of the RAST were: maximum power (Pmax; highest value in the six sprints); and mean power (Pmean; mean power in the six sprints). In addition, Pmax and Pmean values in relation to body mass ($W.kg^{-1}$) of each athlete were also calculated.

Ventilatory threshold

An incremental test (IT) was performed in a treadmill (Super ATL, Imbramed, São Paulo, Brazil) at an initial speed of 7 $km.h^{-1}$, followed by increments of 1 $km.h^{-1}$ at each minute until volitional exhaustion. Heart rate was registered during all procedures (Polar® S810i, Polar Electro Oy, Kempele, Finland).

Ventilatory threshold (VT) was determined as the moment in which occurred an exponential increase in ventilation (VE)[21] according to the ventilometer used (Flowmet, Micromed, Guará, Brasília, Brazil).

Prediction of maximal oxygen uptake (VO_2max)

The equation suggested by the American College of Sports Medicine (ACSM) was used to predict VO_2max, as follows: VO_2 = (0.2 x mean speed in $m.min^{-1}$) + 3.5[22].

Statistical procedures

The normality of the data was analyzed using the Shapiro-Wilk's test. Results of all investigated variables are expressed in mean and (±) standard deviation.

RESULTS

Table 1 presents the anthopometric characteristcs of the evaluated players.

RAST test showed that the evaluated players presented a maximum absolute power (Pmax) of 551.9 ± 73.0 W, maximum relative power (Pmax-relative) of 7.8 ± 0.4 $W.kg^{-1}$, mean absolute power (Pmean) of 484.0 ± 57.8 W, and mean relative power (Pmean-relative) of 6.8 ± 0.2 $W.kg^{-1}$ (table 2).

In addition, velocity and heart rate at ventilatory threshold, as well as at the time of exhaustion (VO_2max) were also measured. The athletes presented mean velocity at VT of 13.8 ± 0.8 $km.h^{-1}$, heart rate at VT of