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ORIGINAL ARTICLE

Body fat in elite Spanish football referees and assistants: A 1-year follow-up study

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KEYWORDS
Adiposity;
Fat body;
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Abstract
Introduction: The current literature about the body composition of elite football referees is scarce and almost non-existent. Therefore, the aim of this study was to assess and track the percentage of body fat (%BF) of elite Spanish football referees and assistant referees across an entire season.
Material and methods: Two hundred and twenty-eight referees and assistant referees (mean age 32.5 ± 5.1 y), refereeing in Spanish First category (La Liga), Second category, and Second-B category, took part in this study. A bioelectrical impedance analyser (TANITA BC 418-MA) was used to evaluate %BF. A total of four-time-points for 1st category referees and three for all other groups were performed throughout the season.
Results: Analysing by category and role, 1st category assistants had the highest %BF in all assessments ($p < 0.05$). Small variations (around 1%) in %BF within groups were observed across the competitive season.
Conclusion: The %BF in elite Spanish referees remains constant, analysing by category, role and age, throughout a competitive season. All groups in this study reported healthy %BF values, between 8 and 14%, which might directly help to achieve the high standards required when refereeing and to improve the level of refereeing in the Spanish leagues.

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PALABRAS CLAVE
Adiposidad;
Grasa corporal;
Impedancia eléctrica;
Fútbol y arbitraje de fútbol

Grasa corporal en los árbitros y asistentes de fútbol de élite: estudio de seguimiento durante un año

Resumen
Introducción: La literatura actual relativa a la composición corporal de los árbitros de fútbol de élite es escasa y prácticamente inexistente. Por tanto, los objetivos de este estudio fueron evaluar y realizar un seguimiento del porcentaje de grasa corporal (%GC) a los árbitros de fútbol de élite españoles, y a los árbitros asistentes, a lo largo de toda la temporada.
Material y Métodos: En este estudio participaron doscientos veintiocho árbitros y árbitros asistentes (edad media $32{,}5 \pm 5{,}1$), que arbitran en la primera división de España (La Liga), la segunda división y la segunda división B. Se utilizó un analizador de impedancia bioeléctrica (TANITA BC 418-MA) para evaluar el porcentaje de grasa corporal. Durante la temporada se realizaron un total de cuatro mediciones en los árbitros de primera división, y tres para el resto de los grupos.
Resultados: Realizando un análisis por categoría y función, los asistentes de primera división tuvieron un mayor porcentaje de grasa corporal en todas las evaluaciones ($p < 0{,}05$). Se observaron pequeñas variaciones (de alrededor del 1%) en cuanto al porcentaje de GC dentro de los distintos grupos a lo largo de la temporada de competición.
Conclusión: El porcentaje de grasa corporal en los árbitros españoles de élite permanece constante, tras analizar la categoría, función y edad a lo largo de la temporada de competición. Todos los grupos incluidos en el estudio reportaron unos valores saludables en cuanto a grasa corporal, comprendidos entre el 8 y el 14%, lo que podría contribuir directamente al logro de los elevados estándares requeridos para el arbitraje, y a la mejora del nivel de arbitraje en las ligas españolas.

Introduction

Important research has been conducted regarding football referees since the first publication in 1994[1] until the last review published in 2012.[2] The physiological aspects of football refereeing such as maximal oxygen uptake or blood lactate levels in referees have been extensively reviewed.[3] In fact, a narrative review about Science and Medicine applied to football refereeing targeted these aspects.[2] However despite the crucial role of referees in a football match, almost no research has aimed to assess their body composition, which may affect their performance.

In this regard, an excess of body fat represents an inert load, associated with an increased metabolic cost and is also strongly associated with low fitness levels in adults.[4] Thus, evaluating body fat levels in elite referees is an important issue in order to achieve the high standards required when refereeing. Especially relevant in years when there is a World Cup or European Football Championship and the football calendar is shorter than other years.

To date, only one research article has been published focusing on body composition in football referees and it was showed that, in preseason, 1st and 2nd B category referees had lower total percentage of body fat (%BF) than 1st and 2nd category assistant referees (9.6 and 9.8% vs. 12.8 and 12.0%).[5] To our knowledge, no studies have assessed the %BF along an entire competitive season in a large sample of male elite football referees and assistants from different categories and age groups. Body composition is one of the most important factors that contribute to optimal exercise performance considering that it can affect athlete's strength, agility, and appearance.[6] For this reason, changes in body composition may affect the performance of referees. Nevertheless, assessing %BF evolution during the season may be easy, for example, bioelectrical impedance analysis (BIA) is a simple, fast and inexpensive method for assessing changes in body composition of large groups of people.[7]

Therefore, the aim of this study was to assess and to track changes in %BF of elite football referees and assistants during the 2012–2013 season officiating Spanish professional Tournaments. This knowledge will serve as reference for %BF across a season in football referees.

It is hypothesized that %BF in professional football referees and assistants will remain unchanged along the whole season.

Material and methods

This longitudinal study was performed in accordance with the Ethical Guidelines of the Helsinki Declaration of 1975 (revised in Fortaleza, 2013).

A total of 20 1st category, 22 2nd category, 120 2nd B category referees, and 40 1st category and 44 2nd category assistant referees participated in this study. All referees and assistants were Caucasian and apparently healthy. They had taken part in the supervised physical training programme that the Real Federación Española de Fútbol (RFEF, in Spanish) implemented.