

Hemodynamic and motion demands of soccer referees: a comparison between series A and B of the State Championship of Rio de Janeiro, Brazil

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Summary

Introduction: Soccer referees need excellent conditioning to withstand the physical and psychological demands of games. **Objective:** To compare the hemodynamic variables, speed, cadence, and distance coursed of referees during soccer games of series A and B in Rio de Janeiro, Brazil.

Material and method: The total number of decisions made during the 10 soccer matches evaluated was 1,224 observable decisions of 10 professional Soccer referees (one per soccer match: 5 in series A and 5 in series B). We used a frequency meter (Polar, model V800, PolarFlow software) and video footage of the games (Sony, model PXW-Z150, 4K). The moments considered were: the decision, 15 seconds that preceded it, and the period from the beginning of each stage to each decision. Were studied the hemodynamic [average heart rate (mean HR), maximum heart rate (HR_{max}), and minimum heart rate (HR_{min})] and motion variables [average speed (V_{med}), maximum speed (V_{max}), average cadence (cadence_{med}), maximum cadence (cadence_{max}), minimum cadence (cadence_{min}), and distance covered]. Descriptive measures were used to present the results of the variables studied and the Student's T-Test for independent samples to test the study hypotheses. The significance level was set at 95% ($P < 0.05$).

Results: The matches of series A had a greater number of interventions and greater hemodynamic load at the exact moment of the decision than those of series B. significantly ($P < 0.05$): mean HR, HR_{max}, HR_{min}, V_{max}, Cadence_{med}, and Cadence_{max} in series A were higher compared to series B. In the 15 seconds before the decisions: mean HR, HR_{max}, and HR_{min} in series A were higher than in series B, and V_{med} in series B was higher in relation to series A. At the exact moment of the decisions: mean HR in series A was higher in relation to series B.

Conclusion: Referees' interventions are generally carried out under high hemodynamic pressure. The matches played in the A series require a higher number of interventions and hemodynamic intensity than the matches in the series B under high hemodynamic pressure, other psychological factors may play a role; however, this needs to be studied in greater depth.

Key words:

Heart rate. Intensity. Decision. Referee. Soccer.

Las demandas hemodinámicas y de movimiento de los árbitros de fútbol: una comparación entre las series A y B del Campeonato Estatal de Río de Janeiro, Brasil

Resumen

Introducción: Los árbitros de fútbol necesitan un excelente acondicionamiento para soportar las exigencias físicas y psicológicas de los partidos.

Objetivo: Comparar las variables hemodinámicas [frecuencia cardíaca media (mean HR), frecuencia cardíaca máxima (HR_{max}) y frecuencia cardíaca mínima (HR_{min})] y desplazamiento [velocidad media (V_{med}), velocidad máxima (V_{max}), cadencia media (cadence_{med}), cadencia máxima (cadence_{max}), cadencia mínima (cadence_{min}) y distancia recorrida] durante intervenciones arbitrales en partidos entre las series A y B en Río de Janeiro, Brasil.

Material y método: Se analizaron 1.224 decisiones observables de 10 árbitros profesionales de fútbol cada uno en 1 partido (10 partidos del Campeonato Carioca: 5 en la serie A y 5 en la B). Se utilizaron frecuencímetros (Polar, modelo V800, software PolarFlow) y secuencias de video de los juegos (Sony, modelo PXW-Z150, 4K). Los momentos considerados fueron: la decisión, los 15 segundos que la precedieron y el tiempo desde el inicio de cada etapa hasta cada decisión.

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