FIFA Women’s World Cup 2011: Pre-Competition Medical Assessment of female referees and assistant referees

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ABSTRACT

Background Precompetition screening was implemented for male referees during the 2010 Fédération Internationale de Football Association (FIFA) World Cup. In contrast, female football referees have been neglected in this respect although they experience similar physical workloads compared to male referees.

Methods The standardised football-specific Pre-Competition Medical Assessment (PCMA) was performed in 51 referees and assistant referees selected for the 2011 FIFA Women’s World Cup.

Results Family history for sudden cardiac death (SCD) was positive in four referees (7.8%), but cardiac examinations did not reveal any pathological findings. Training-unrelated ECG changes were identified in three referees (5.9%), all without correlates in echocardiography or clinical examination. Most common echocardiography findings (66.6%, n=34) were asymptomatic tricuspid and mitral regurgitations.

Conclusions During the present screening, no elite female referee was identified being at risk for SCD, and no referee had to be excluded from participating in the 2011 FIFA Women’s World Cup.

INTRODUCTION

Preparticipation screening programmes to prevent sudden cardiac death (SCD) among young athletes have been accepted based on numerous proposals.1–3 For elite male football players, the Fédération Internationale de Football Association (FIFA) introduced a standardised football-specific Pre-Competition Medical Assessment (PCMA) starting in the 2006 FIFA World Cup4 and subsequently introduced it for female players; it is now mandatory in all FIFA competitions.5 PCMA was implemented for male referees selected for 2010 FIFA World Cup and data were published recently.6 Concerning female referees no data about PCMA have systematically been assessed, yet. Female referees experience similar physical workloads compared to male referees and therefore are at the same risk for SCD as a normal sport population or male referees. In this study, the cardiovascular findings obtained in the PCMA of female referees and assistant referees selected for the FIFA Women’s World Cup 2011 were analysed.

METHODS

The PCMA protocol includes medical history, general physical examination, 12-lead resting ECG and transthoracic echocardiography. The standardised PCMAs were performed at the FIFA headquarters in Frankfurt from 17 to 19 June 2011. All referees gave written informed consent. Experienced physicians including a cardiologist (DIK) conducted all examinations. ECG’s were analysed according to current recommendations of the European Society of Cardiology (ESC). Findings were grouped into common/training-related and uncommon/training-unrelated.7 Transthoracic echocardiographies were performed and interpreted based on current recommendations.8 Data were acquired for each referee on the ‘Pre-Competition Medical Assessment—Individual Report’ sheet, provided by F-MARC, Medical Research Office, Schulthess Clinic, Zuerich, Switzerland. Mean values and SDs were determined on the Microsoft Excel programme.

RESULTS

Nineteen female referees and 32 assistant referees underwent precompetition screening. Baseline characteristics were of an average age of 33.2 (SD=3.8, range 25–41) years, average height of 166 (SD=5.4, range 150–181) cm, average weight of 60.1 (SD=5.5, range 48–73) kg and average body surface area of 1.7 (SD=0.1, range 1.45–1.93) m².

In family history, 19 (37%) referees reported hypertension, 11 (21.5%) diabetes mellitus, nine (17.6%) coronary heart disease (CHD), five (9.8%) stroke and two (3.9%) valvular heart disease. Three (5.9%) referees reported familial SCD, another one (2%) reported SCD due to CHD. In general medical history one (2%) referee reported diabetes mellitus type I and another (2%) a suprarenal hyperplasia. Allergies to pollen, food or antibiotics were common (n=17; 33.3%), three (5.9%) referees had exercise-induced asthma. No cardiovascular medication was reported but insulin. Non-steroidal painkillers were used regularly by 23 (45%) referees and 11 (21.5%) took antihistaminics.

Right arm systolic blood pressure was on an average 107.1 (SD=9.9, range 90–131) mm Hg, diastolic 67.3 (SD=10.2, range 48–95) mm Hg. Left arm systolic blood pressure was on an average 105.5 (SD=10.1, range 84–141) mm Hg, diastolic 67.2 (SD=9.2, range 49–95) mm Hg. The average heart rate at rest was 59.8 (SD=9.9, range 47–91) bpm.

Auscultation revealed in 16 (31%) referees a systolic heart murmur without echocardiography finding, though considered as ‘functional’. A mild systolic murmur was found in one referee (2%) with mild central aortic regurgitation with a tricuspid aortic valve with slight asymmetry of the cusps, in one (2%) with mild-to-moderate mitral regurgitation due to discrete myxoid changes without
mitral valve prolapses and in one (2%) with a small ventricular septum defect (VSD). In one referee (2%) with a very mild systolic murmur, a very small VSD was detected.

Echocardiography findings are summarised in table 1. No referee revealed a hypertrophic left ventricle (LV) or cardiomyopathy. Average LV values were: interventricular septal diastolic (IVSd) 7.9 (SD=1, range 6–10) mm, posterior wall diastolic (PWD) 8.3 (SD=1, range 6–10) mm, LV muscle mass index 71.5 (SD=11.5, range 48–95) g/m² and LV enddiastolic diameter index (LVDDI) 51.5 (SD=9.1, range 35–73) mm/m². LV ejection fraction was on average 73 (SD=7.8), L V enddiastolic pressure –1.2). Both were advised to follow-up blood pressure measurement.

Systolic heart murmurs were the most common cardiac finding whereas echocardiography revealed in 34 (n=66.6%) referees a tricuspid or mitral regurgitation. In comparison with the present study, all referees were completely asymptomatic and revealed no uncommon findings in 12-lead resting ECG or echocardiography except for one (1.9%) referee with isolated T-wave inversion in lead III. No exercise ECG was performed in the present study.

In this study the standardised PCMA’s have been performed shortly before the 2011 FIFA Women’s World Cup. Precompetition and preparticipation screening should be performed in every referee or athlete in general. Some of the referees did already profit from previous screening in their home countries, which contributes to this selection of ‘healthy’ referees.

CONCLUSIONS
PCMA is a feasible tool to identify referees at risk for SCD and has to be repeated on a regular basis. No elite female referee was identified being at risk for SCD and had to be excluded from participating in the 2011 FIFA Women’s World Cup.

Acknowledgements We gratefully acknowledge the FIFA for the funding of this study. We greatly appreciate the support of and collaboration with Mrs Sonia Denoncourt, Head of Women’s FIFA Refereeing and of Mr Edgar Streisol, FIFA Refereeing Department.

Contributors DIK performed cardiac examination, data analysis and manuscript writing. MB and NF: performed clinical examination. AJ and JD instrumented the study design, provided support and feedback at all stages of the study and heavily contributed to writing and reviewing the manuscript. All coauthors reviewed and improved the study.

Competing interests None.

Patient consent Obtained.

Ethics approval Institutional Review Board.

Provenance and peer review Not commissioned; externally peer reviewed.

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REFERENCES

1  Corrado D, Pelliccia A, Bjornstad HH, et al. Cardiovascular pre-participation screening of young competitive athletes for prevention of sudden death. *Eur Heart J* 2005;26:516–24.

2  Borjessen M, Urhausen A, Kouidi E, et al. Cardiovascular evaluation of middle-aged/senior individuals engaged in leisure-time sport activities. *Eur J Cardiovasc Prev Rehabil* 2011;18:446–58.

3  Maron BJ, Thompson PD, Ackermann MJ, et al. Recommendations and considerations related to preparticipation screening for cardiovascular abnormalities in competitive athletes. *Circulation* 2007;115:1643–53.

4  Dvorak J, Grimm K, Schmied C, et al. Development and implementation of a standardized precompetition medical assessment of international elite football players—2006 FIFA World Cup Germany. *Clin J Sport Med* 2009;19:316–21.

5  Dvorak J, Grimm K, Schmied C, et al. Feasibility of precompetition medical assessment at FIFA World Cups for female youth players. *Br J Sports Med.* Published Online First 20 October 2011. doi:10.1136/bjsports-2011-090374.

6  Bizzini M, Schmied C, Junge A, et al. Precompetition medical assessment of referees and assistant referees selected for the 2010 FIFA WORLD CUP. *Br J Sports Med* 2012;46:374–6.

7  Corrado D, Pelliccia A, Heidbuchel H, et al. Recommendations for interpretation of 12-lead electrocardiogram in the athlete. *Eur Heart J* 2010;31:243–59.

8  Lang RM, Bierig M, Devereux RB, et al. Recommendations for chamber quantification. *J Am Soc Echocardiogr* 2005;18:1440–63.

9  Sidiropoulou MP, Kokaridas DG, Giagazoglou PF, et al. Incidence of exercise induced asthma in adolescent athletes under different training and environmental conditions. *J Strength Cond Res* 2012;26:1644–50.

10  Grossman E, Messerli FH. Drug-induced hypertension: an unappreciated cause of secondary hypertension. *Am J Med* 2012;125:14–22.