



## EDITORIAL COMMENT

**Defeat may not be the worst result!****A derrota pode não ser o pior resultado!**Hélder Dores <sup>a,b,c</sup><sup>a</sup> Hospital das Forças Armadas Lisboa, Lisboa, Portugal<sup>b</sup> Hospital da Luz, Lisboa, Portugal<sup>c</sup> NOVA Medical School, Lisboa, Portugal

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It is well known that behavioral and emotional stress can trigger acute cardiovascular events. The most frequent cardiac disorders associated with emotional stress are tachyarrhythmias, acute coronary syndromes and specific conditions such as takotsubo cardiomyopathy, also known as stress cardiomyopathy or broken heart syndrome. Examples of acute and chronic stressors are natural disasters (e.g. earthquakes and floods), extreme environmental conditions, armed conflict, post-traumatic stress disorder, work-related stress ('job strain'), marital problems, burden of caregiving, social isolation and other conditions characterized by increased anxiety and mental stress.

A relationship between watching sports and the incidence of acute cardiovascular events is also commonly described, but the evidence supporting this association remains scarce and controversial. The available data are largely derived from retrospective epidemiologic studies focusing on major soccer matches. The main trigger for a stress-induced event seems to be the intense stress and excitement experienced during a dramatic match, such as one with a penalty shoot-out. A landmark analysis in this field, performed by Wilbert-Lampen et al.<sup>1</sup> during the FIFA World Cup held in Germany in 2006, showed that viewing a stressful soccer match more than doubles the risk of an acute cardiovascular event. On days of matches involving the German team, the incidence of cardiac emergencies was 2.7 times higher

than during a control period. On days when the German team played, patients with known coronary heart disease had the highest incidence of events (ST-segment elevation myocardial infarction, non-ST-segment elevation myocardial infarction or unstable angina, and symptomatic cardiac arrhythmias), most of which occurred within two hours of the beginning of the match. These cardiac emergencies were more frequent in men, which is probably explained by gender-specific pathophysiological differences or greater interest in soccer.

However, other studies have reported neutral and even contradictory results. A study during the 1998 FIFA World Cup<sup>2</sup> showed a lower incidence of acute myocardial infarction on the day of the final, while analyses of other FIFA World Cups,<sup>3</sup> especially of matches involving Brazil, showed a higher incidence of myocardial infarction, but not of in-hospital mortality. One of the limiting aspects in these studies is that exposure to the stressor factor (soccer matches) was not homogenous, because some of the population may not have watched the games and relevant variables were not recorded.

The pathophysiology behind the association between stressful events and acute cardiac events is not well understood. Although causality can rarely be established, various mechanisms may be involved, particularly sympathetic activation, reduced vagal tone and endothelial dysfunction.<sup>4</sup> Among these mechanisms, increased heart rate while watching sports competitions, frequently with similar values to the cardiac stress induced by vigorous exercise, is probably involved.<sup>5</sup> Blood pressure, inflammatory markers, levels of stress hormones (e.g. catecholamines

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and cortisol) and vasoconstriction are also elevated during intensely emotionally stressful events. These reactions increase myocardial oxygen demand and can decrease myocardial oxygen supply.<sup>4</sup> With respect to coronary artery disease, chronic stress may also affect the development of various cardiovascular risk factors and influence the progression of atherosclerosis. The greater incidence of cardiovascular events in individuals with known coronary artery disease, as observed in some previous studies, may be related to the presence of vulnerable plaques that are more prone to rupture and precipitate acute coronary syndromes. This plaque instability may be the consequence of shear stress induced by high blood pressure and stress-induced vascular resistance.

Given the great popularity of soccer, the association between emotional stress while watching matches and adverse cardiovascular clinical events may have public health implications. In this issue of the *Journal*, Martins et al.<sup>6</sup> present the HeartAtaque trial, an analysis of the potential effect of watching soccer matches on the incidence of cardiovascular events in 82 male supporters with known coronary artery disease according to the results of 23 matches. These participants, who scored highly on the Football Supporter Fanaticism Scale, underwent 24-hour Holter monitoring on the day of their team's match and on a control day. The primary endpoint was the composite of death, stroke, reinfarction, angina or sustained arrhythmia. The number of cardiovascular events and the incidence of the various endpoints studied were not significantly different according to the match result.

This original study is insightful, exploring the potential association between important soccer matches and cardiovascular events in Portugal, a country where soccer is by far the most popular sport. However, as the authors reported, some points should be taken into consideration and investigated more thoroughly in future studies. The authors assume that patients with pre-existing coronary artery disease had more extensive underlying disease, which made it more likely that they would more frequently suffer acute coronary syndromes compared to patients who were considered healthy before the event. However, although a past history of coronary artery disease constitutes a substrate for recurrent acute coronary events and significant arrhythmias, secondary prevention with optimal medical therapy after the index event may underpower the results.

Additionally, certain common high-risk behaviors while watching a game, such as smoking, eating fatty foods and consuming alcohol, should be taken into consideration. The study of larger samples including individuals with a broader spectrum of cardiovascular risk, during a longer follow-up and with greater exposure to stress, is needed to clarify this issue.

Although numerous issues still need to be clarified, it is clear that acute cardiovascular events among spectators watching sports on television or at the stadium are not rare, and that watching an exciting soccer match can trigger acute events in individuals with high cardiovascular risk. In this context, a variety of approaches should be adopted, including risk stratification, stress management, and providing sports arenas with emergency support, including defibrillator capacity. In terms of cardiovascular health, current evidence suggests that defeat may not be the worst result and that the risk of an acute cardiovascular event may well be higher when watching than when playing a game!

### Conflicts of interest

The authors have no conflicts of interest to declare.

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