



## Sports Events and Acute Coronary Syndrome: Possible Confounding Factors and Bias

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### Dear Editor,

The relationship between sports events and ACS (Acute Coronary Syndrome) has been the subject of some studies in the literature, with controversial results, and was recently addressed by Borges et al<sup>1</sup> in the manuscript entitled “World Soccer Cup as a Trigger of Cardiovascular Events,” published in volume 6 of 2013 of ABC. The authors observed a higher incidence of AMI (Acute Myocardial Infarction) in match days of the FIFA World Cup and, in particular, on Brazilian games, concluding that this sporting event can act as a “trigger” of AMI in Brazilians. However, considerations of possible confounding factors and bias should be made to present to readers a better interpretation of the data presented. Firstly, the literature describes that, during sporting events, viewers tend to have numerous risk behaviors for cardiovascular disease, such as the intake of large amounts of alcohol, consumption of fatty food, and use illicit drugs and smoking<sup>2,3</sup>. These factors have also

been described as possible triggers for ACS<sup>4,5</sup>, making the association between FIFA World Cup and ACS established in the research of Borges et al<sup>1</sup> subject to a number of confounding factors and hindering the interpretation of results. Defining, as the authors intend, if the World Cup could be seen as a direct “trigger” for ACS is not possible or merely if it entails a number of risk conditions already well described in the literature. Furthermore, the use of research findings by observing groups of people to infer causal relationships in individuals may result in ecological fallacy<sup>5</sup>, since it is not possible to state that all individuals who attended the event were exposed the same way. Therefore, the study design presented by Borges et al<sup>1</sup> does not allow the establishment of a direct association between the occurrence of ACS and the FIFA World Cup, and the interpretation of the study results should be performed carefully, taking into account the potential confounding factors and bias of ecological study.

### Keywords

Acute coronary syndrome; Football; Alcoholism; Tobacco; Substance- Related Disorders.

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## Reply

We would like to thank our colleagues who sent this letter, which has allowed further discussion on this quite intricate subject<sup>1</sup>. Firstly, we agree to the assertions that, over sport events, viewers tend to have a number of risk behaviors for cardiovascular diseases, such as the intake of great amounts of alcoholic beverages, eating of fatty food, use of illicit drugs and smoking, given that the limitations of our research have been addressed in our discussion. However, it is important to note that the measurement of all possible confounding factors referred to is difficult (illicit drugs, for instance), even in prospective studies, as this may be subject to a biased observation<sup>2</sup>. We stress the limitations of our data, retrieved from a public database, which restricted the availability of data to protect the individual's secrecy rights. Another point to be raised is that these potential confounding factors not available in our study may present collinearity with the statement of interests (watching the World Cup and Brazilian matches) and would require a high-cost prospective design to remove all the factors raised<sup>3,4</sup>.

Regarding the second remark about the problems associated with ecological studies, we believe that they are also properly pointed out in our discussion, as one can see that

*"...the exposure may not be uniform (a part of the population may not be watching the match)"*.

However, even with the considerations raised and clarified above, although we are not able to definitively confirm a causal association between the games and the occurrence of cardiovascular events, we still can assume that these two factors are related, despite the correction for confounding factors available. Moreover, a simple association, easily identifiable and which may be used immediately can be more useful for health planning than establishing the cause and effect relation from the pathophysiological point of view. Until further information is available and considering everything that has been studied in the literature, this information seems consistent with most other studies, and we believe that our findings should be maintained.

Sincerely,

**Antonio Pazin Filho**  
**Daniel Guilherme Suzuki Borges**  
**Rosane Aparecida Monteiro**  
**André Schmidt**

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