

The importance of the electrocardiogram in the competitive pre-period

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ABSTRACT

The electrocardiogram is a safe and practical exam that allows the diagnosis of subclinical pathologies in asymptomatic athletes. In order to reduce false positives, it is of the utmost importance that this analysis be performed based on criteria specific to athletes. To analyse electrocardiograms according to the criteria of Seattle performed to athletes in the pre-competitive phase, in two consecutive years. A longitudinal observational study was performed in 14 athletes from different sport modalities who underwent a pre-competitive evaluation in two consecutive years. The average age of the athletes was 24.5 ± 4.9 years, of which 13 were male (92.9%) and 1 were female (7.1%). According to the Seattle Criteria, electrocardiographic changes were recorded in 10 individuals (71.4%), 6 of which were considered physiological, 2 were borderline and 2 were pathological. In the relation between the two years there was an increase of electrocardiographic alterations. Most of the alterations found were classified as physiological according to the Seattle Criteria, although they could be considered pathological following non-specific criteria for athletes. The electrocardiographic analysis of these athletes allowed to track two athletes with alterations considered pathological according to the criteria of Seattle. **Keywords:** Electrocardiogram; Athletes; Seattle Criteria.

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INTRODUCTION

Regular and intense practice can lead to physiological cardiac changes, both at the structural and functional and electrical levels. The electrocardiogram (EKG) stands out as an increase in the ability to identify silent cardiac pathologies in asymptomatic athletes, since it is an examination that allows the detection of about 70 to 90% of the cases of hypertrophic cardiomyopathy, sometimes even before thickening of the ventricular wall and the earlier the diagnosis is made, the greater the possibility of effective preventive and therapeutic interventions (Prutkin and Drezner, 2017).

MATERIAL AND METHODS

This is a longitudinal observational study, in which the EKGs of young federated athletes were analysed during the pre-competitive phase. Each athlete, before completing the examination, followed the procedures of the laboratory, for which he completed a questionnaire regarding sports, personal and family history of heart disease, smoking and alcoholic habits. For the examinations and questionnaires to be used in this study, the researchers obtained the informed consent of each athlete.

Participants

The sample was selected according to the inclusion criteria; age > 18 years, to be federated, to practice sports for at least 5 years and to have performed an electrocardiogram in two consecutive years in the ECG laboratory where the sample was collected.

In this way, 14 individuals were selected, of which 13 (92.9%) were male and 1 (7.1%) were females aged between 21 and 28 years and a mean of 24.5 ± 4.95 years.

Measures

The electrocardiograms were performed using the Schiller AT 101 equipment. For the interpretation of the exams, the conventional recommendations and the Seattle Criteria (Dores and Freitas, 2014) were used in order to properly classify the changes in athletes.

Procedures

For measurement of the waves and intervals of each EKG, a single measurement standard was followed. The electrical axis measured on the QRS in the DI and DII leads, the heart rate calculated by the 1500 method, the P wave lengths and amplitudes, PQ, QT interval and QTc calculated on the DII derivation of all electrocardiograms. The amplitude and duration of the QRS were measured in the leads where they were larger. We also collected the answers to the questionnaire, with a descriptive analysis.

Analysis

All collected data were entered, analysed and treated statistically through the software Statistical Package for the Social Sciences (IBM SPSS Statistics® version 22).

The chi-square or Fisher's exact test was used for the relation between nominal variables. In the correlation between ordinal variables, the Kendall Tau b test was used and to evaluate differences in the classification of the electrocardiographic alterations according to the different Wilcoxon test criteria.

RESULTS

In the comparison between the two years it was observed that there was an increase in electrocardiographic changes between year 1 and year 2 by conventional EKG analysis criteria (57% vs 64.3%). There was an increase in cases with axis deviation, branch blocks and hemiblock marks between the two years. Most of the alterations found were considered physiological according to the criteria of Seattle. However, pathological changes were found in 2 athletes and in 2 other borderline patients.

DISCUSSION

The athletes participating in this study had an average of 9.64 years of sports practice and trained on average about 7 hours per week. According to the World Health Organization (WHO), adults are advised to take at least 150 minutes of moderate-intensity exercise a week. Within these time limits, individuals generally do not experience any side effects, and cardiac adaptations are often not classified as modifications observed in high-performance athletes, whether professional or amateur (Nobrega, 2013). According to the study by Ghorayeb and Giuseppe (2005), sinus bradycardia is characterized by cardiac frequencies lower than 60bpm, which is present in 80% of highly trained athletes, and in this type of athletes normal heart rates up to 30bpm were considered. On average, the athletes did not present bradycardia at rest with the minimum value recorded in year 1 of 47bpm and year 2 of 45bpm.

In year 1 our results show that two athletes presented deviation of the cardiac axis and in year 2 they suggest 2 new cases of axis deviation. Stein and Silveira (2011) report that a slight deviation of the axis to the right or left in athletes should not generate future research, unless there is a history of pulmonary disease or hypertension, respectively. According to Seattle's criteria (Dores and Freitas, 2014), the left axis deviation and the right deviation should be classified as borderline, so if isolated individuals do not need further evaluation, however, in the presence of two or more changes, they require a more in-depth study of the athlete. In our study, two of the studied athletes who presented axillary changes also presented other alterations. In this sense, these athletes were referred to the Sports Medicine.

From year 1 to year 2, although there have been some changes in the electrocardiographic patterns of the athletes, in general there was no worsening of the changes, and there was even a regression of the T wave inversion, which may be related to the persistence of juvenile pattern.

In the present study, EKG analysis was performed according to conventional criteria for electrocardiographic analysis, not specific for athletes, and according to the criteria of Seattle (Dores and Freitas, 2014), in order to adjust the classification of the changes and, together, to demonstrate the relevance of knowing the specific criteria for athletes in order to avoid an incorrect diagnosis and increase of false positives.

CONCLUSIONS

The inclusion of the ECG in the pre-competitive evaluation is essential to rule out the presence of pathological changes in athletes.

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