ELECTROCARDIOGRAPHIC CHANGES AS PHYSIOLOGICAL ADAPTATIONS IN CHILDREN AND YOUNG ADOLESCENT ATHLETES

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INTRODUCTION: Regular participation in intensive exercise is associated with specific electrical manifestations that reflect increased vagal tone and structural remodelling of the heart. Sport category is an important determinant of cardiac adaptation. Sports can be characterised as being high or low in dynamic and static components. Most of the literature concerns the effect of exercise in adult athletes.

AIMS: This study aims to assess the influence of sports category on electrocardiographic findings in young athletes who participate in class IC (low static, high dynamic) and IIIA (high static, low dynamic) competitive sports.

PARTICIPANTS AND METHODS: Ninety-two young athletes (range 10 to 18 years; 91% male) were included: 50 soccer players (IC) and 42 competing in martial arts (IIIA): judo (24), karate (17) and taekwondo (1). Inclusion threshold was based on at least one year of training in competitive sports. They were investigated in outpatient sports clinic, by physician, licensed specialist in sports medicine. The 12-lead ECGs were analysed following recent guidelines on the interpretation of ECGs in athletes. For each sports group - class IC and class IIIA - prevalence of ECG changes was analysed; comparison between groups was assessed using two-way joining cluster analysis.

RESULTS: Of examinees, standard 12-lead ECG with changes have had 58 athletes (58/92, 63%); in the group of soccer players 31/50 (62%), and in the martial arts group 27/42 (64.3%) (chi-square=0.051, p=0.8210). The most frequent ECG changes in both groups included sinus bradycardia, incomplete RBBB, and nonspecific intraventricular conduction disturbances. Other ECG changes were: sinus arrhythmia, atrial ectopic rhythm, first degree AV block, complete RBBB, isolated QRS voltage criteria for LVH, left atrial enlargement, early repolarization, repolarization abnormalities, long-QT interval, and supraventricular extrasystoles. With chi-square test there were no difference between the two groups for any of that changes (p greater than 0.05). But in soccer players group more athletes have had combination of changes (chi-square=5.123, p=0.0236).

CONCLUSIONS: In a study population of young athletes, ECG findings related to physiological cardiac adaptations are frequent. Different sport category didn’t influence on specific type of ECG changes, but in a group of low static and high dynamic activity ECG changes were more noticeable.

Figure 1. Prevalence of athletes with ECG changes (58; 63%) in total athletes population (N=92).

Table 1. Prevalence of ECG changes in athletes.

<table>
<thead>
<tr>
<th>Athletes</th>
<th>sinus bradycardia</th>
<th>sinus arrhythmia</th>
<th>low right atrial rhythm</th>
<th>1st degree AV block</th>
<th>RBBB</th>
<th>early repolarization</th>
<th>LAE</th>
<th>LVH</th>
<th>repolarization disturbances</th>
<th>LAD</th>
<th>RBBB</th>
<th>LVH</th>
<th>repolarization disturbances</th>
<th>LAE</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soccer players N=50</td>
<td>10</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>10</td>
<td>5</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>9</td>
<td>5</td>
<td>1</td>
<td>48</td>
</tr>
<tr>
<td>Martial arts athletes N=42</td>
<td>5</td>
<td>6</td>
<td>2</td>
<td>2</td>
<td>5</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>7</td>
<td>3</td>
<td>0</td>
<td>33</td>
</tr>
<tr>
<td>Total</td>
<td>15</td>
<td>8</td>
<td>3</td>
<td>3</td>
<td>15</td>
<td>6</td>
<td>1</td>
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<td>1</td>
<td>1</td>
<td>2</td>
<td>16</td>
<td>8</td>
<td>1</td>
<td>81</td>
</tr>
</tbody>
</table>

Table 2. Prevalence of ECG changes in soccer players.

Table 3. Prevalence of ECG changes in martial arts athletes.

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