

Gender & Sport Related Differences in Electrocardiogram & Pre-Participation Exams (PPE) in College Age Athletes

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ABSTRACT

Purpose: The NCAA requires all college level athletes to receive a pre-participation physical exam (PPE). However, most colleges do not require electrocardiogram (ECG) screening to help detect cardiac abnormalities. Using specific ECG markers could help detect cardiac abnormalities based on gender and or sport. The purpose of this study was to provide preliminary information about the usefulness of 12-lead ECGs in detecting potential cardiac risk during sport.

Methods: Division II level college level athlete's ages 18 to 25 (N=111) participated in this study. Age, gender, height, weight, BMI, blood pressure and heart rate were measured during PPE exams. Twelve-lead ECG (ECG) was obtained, categorized by sport, and analyzed by the lab director and attending physician. One-way ANOVA was used to analyze differences in ECG findings between sports (football (n=40), basketball (BB, n=10), track and field (T&F, n=18), and cheerleading (n=20). Independent t-test were used to analyze ECG differences between genders. Significance was set at alpha 0.05 level.

Results: The group was analyzed for ECG differences between sports. Track & field (T&F)(114 ± 8.2 mmHg) and cheerleading (114 ± 7.4 mmHg) had significantly lower resting systolic BP than football (FB)(126 ± 11.8) and basketball (BB) (124 ± 8.7)($p=0.0001$). P wave duration was significantly higher FB (0.081 ± 0.021) compared to BB (0.072 ± 0.017), T&F (0.075 ± 0.012), and cheerleading (0.066 ± 0.023) ($p=0.05$). Furthermore, QT_c measures were significantly lower in FB (0.35 ± 0.07) compared to BB (0.45 ± 0.16), T&F (0.41 ± 0.05), and cheerleading (0.38 ± 0.03). No significant differences were noted for any ECG parameters between genders. Systolic BP (male= 123.5 ± 11.3 mmHg; female= 110.6 ± 9.0 mmHg) (0.0001), diastolic BP (male= 71.9 ± 8.0 mmHg; female= 68.0 ± 7.0 mmHg) (0.006), and resting rate pressure product (male= 89.0 ± 19.9 mmHg·bpm/100; female= 79.1 ± 17.3 mmHg·bpm/100) (0.021) were significantly higher in males than females. Of all 111 athletes 5, 12-lead ECGs required follow-up with the attending physician to rule out cardiac risk during activity. All 5 athletes were cleared, and none were required to obtain further diagnostic procedures.

Discussion: Electrocardiogram markers that may be identified as potential risk depending on sport, gender, and race should be a focus of all PPE. The screening procedures is very low, risk and takes only a few minutes to complete. Further investigations are needed to focus on sport and race specific ECG abnormalities, as well as follow-up with the athlete upon graduation to match the PPE, ECG with any activity related injuries or sudden death.