

Electrocardiographic and Echocardiographic Findings in Black Athletes: A General Review

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Abstract

Background: Participation in regular physical activity produces electrophysiological and structural cardiac changes in electrocardiograms (ECGs) and echocardiographs (ECHOs) of athletes, and the term “athlete’s heart” is used to describe these physiological cardiovascular adaptations. Extent and type of sporting discipline, age, sex, body dimensions, and ethnicity have an influence on cardiac remodeling. **Objective:** As the recent scientific literature increasingly reports on ethnicity-specific ECG and ECHO findings in black athletes, it is the aim of this review to provide an overview of ECG and ECHO findings among athletes of black African/Afro-Caribbean descent. **Data Sources:** A systematic search of PubMed and MEDLINE databases up to and including August 2017 was conducted using the following terms/phrases “black OR African OR Afro-Caribbean athlete heart,” “black OR African OR Afro-Caribbean athlete electrocardiogram,” and “black OR African OR Afro-Caribbean athlete echocardiogram.” The search generated a total of 130 papers, out of which 16 original articles fitted our criteria and were selected for this review. **Main Results:** The various studies reviewed revealed that about 10% to 30% of black African/Afro-Caribbean athletes had abnormal ECG. R/S voltage criteria exceeding hypertrophic indices were found in about 60% to 89% of black African/Afro-Caribbean athletes. ST-segment elevation (17%-90%) and T-wave inversions were also common findings among this ethnicity. About 10% to 12% of black African/Afro-Caribbean athletes had a left ventricular wall thickness ranging from 13 to 15 mm. Cavity dimensions ranged from 40 to 66 mm in black African/Afro-Caribbean athletes with a relative wall thickness >0.44. **Conclusions:** Updated ethnic-specific guidelines are required to discriminate physiological from pathologic hypertrophy and repolarization changes. Future studies should focus on homogeneous cohorts of African athletes.

Key Words: electrocardiography, echocardiography, athlete’s heart

(*Clin J Sport Med* 2019;00:1–9)

INTRODUCTION

Regular intensive exercise training and sports participation leads to an increased cardiac output to meet the greater demands of the performing skeletal muscles. This adaptation leads to various cardiac electrical, structural, and functional changes that can be seen on the athlete’s electrocardiogram (ECG) and echocardiograph (ECHO), collectively known as the “athlete’s heart.”^{1–3} Alterations in cardiac dimensions and structural adaptations such as concentric remodeling are also frequently reflected on imaging techniques such as cardiac magnetic resonance imaging (MRI) and ECHO.^{3,4} Several factors affect the degree of cardiac, electric, and structural remodeling including age, sex, body size, type of sport, and race.

Researchers in the field of sports medicine and cardiology in recent years have focused on the influence of ethnicity on cardiovascular adaptation to sports in the light of the increasing numbers of athletes of African descent excelling

at elite competitive levels.^{5,6} In the United States and the United Kingdom where almost 13% and 2%, respectively, of the population is of black ethnicity, over 70% of National Football League and National Basketball Association players in the United States are blacks and a disproportionate 20% of the English Premier League players are of African descent.⁵

Results from studies involving African/Afro-Caribbean athletes reveal cardiac remodeling different from what is documented among Caucasians.⁷ Although commonly falling within the defined limits of physiological normality, these cardiac adaptations and remodeling, which include repolarization anomalies, voltage criteria for left ventricular hypertrophy (LVH), and ECHO-derived LVH-concentric remodeling, can sometimes lead to a diagnostic dilemma for the practicing physician where they may overlap with the phenotypic expression of pathology such as hypertrophic cardiomyopathy (HCM), especially in endurance athletes^{8–10} and athletes of African descent.¹¹ This tends to raise questions regarding the applicability of criteria derived from Caucasian studies to these ethnic groups.

Therefore, it is the aim of this article to review available data on ECG and ECHO findings among athletes of African/Afro-Caribbean descent and to provide readers with an overview of the ECG and ECHO findings in black athletes. The differences in cardiac morphological adaptation that exist between athletes of black African origin and their Caucasian counterparts will be critically evaluated.

METHODS

A search through PubMed and MEDLINE was conducted between March and April 2017, using the relevant search

Submitted for publication December 13, 2017; accepted February 9, 2019.

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The authors report no conflicts of interest.

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<http://dx.doi.org/10.1097/JSM.0000000000000754>