

The importance of electrocardiography parameters in healthy Iranian children

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Letter to Editor

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Dear Editor-in-Chief

Electrocardiography (ECG) is the process of recording electrical activities of the heart. In a 12-lead ECG, 12 electrodes (10 lead + V₃R and V₄R) are placed on the patient's chest to record the tiniest changes in his/her electrical heart activities. Nowadays, ECG is considered as the first non-invasive tool for diagnosis and treatment of congenital heart diseases, especially for diagnosis of arrhythmias, cardiac conduction disorders, and congenital heart diseases before and after treatment. Moreover, one of the advantages of ECG is that the severity of the disease and associated problems can be recognized. Still, more cases of counseling for children's congenital heart disease (CHD) are performed without ECG.

CHD is a complex disorder that affects the structure or function of the heart caused by birth defects and the most common heart disease in newborns in the world. CHD increases risk of ischemic stroke due to arrhythmias, cardiovascular abnormalities, and residual shunts.¹ The importance of ECG in children is that cardiologists who care for adults have no or minimal experience with ECGs recorded for infants or children.² Moreover, the most important ECG parameters should be considered in children include ensuring the standardization of ECG in the first step, ventricular rhythm, the origin of pacemaker, hypertrophy and atrial enlargement, T, P and QRS axis, right and left bundle branch block, etc.

Due to the approximately equal systemic circulation and pulmonary vascular resistance, heart intrauterine activity creates equal muscular masses in the left and right ventricles in term fetuses. Contrary to the low resistance of pulmonary vessels, systemic vascular resistance increases after birth. This change appears with variations in the QRS complex. During the first days of life, right axis deviation and a positive T wave in the right precordial leads are natural; while a few days after birth, right ventricular pressure should be reduced due to a reduction in the

pulmonary artery pressure, and negative T waves can show sudden decrease in pulmonary vascular resistance. However, if it remains positive after the first week, it will be either physiologic or pathologic such as caused by right ventricular ischemia (juvenile T-wave pattern). Another application of ECG in children is that thinning of the right ventricle and increased force in the left ventricle appear as changes in QRS-T on the right-sided leads and dominance of R wave in V₁, V₃, and V₃R leads in children from 6 to 8 years of age.

We have discussed some of the important issues in CHD in children and high diagnostic value provided by 12-lead ECG. In addition, normal values for Middle Eastern children have not been published. Racial, age, and sex dependence of ECG variations are proven in various studies. Recently, Macfarlane et al. suggested that race should take into account to have a proper interpretation of ECG.³ They also noted that race has a significant effect on ECG. As another example Kolawole and Omokhodion study can be noted.⁴ Overall, the literature review indicates that different guidelines have been published to interpret children's ECG parameters across the world.⁵ It should be noted that appropriate criteria for interpreting the results of children's echocardiography are required in this geographical area. However, we are writing to Iranian pediatric cardiologists that currently there are no such standard parameters for children.

Conflict of Interests

Authors have no conflict of interests.

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