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THE ABNORMALITIES IN ELECTROGRAM OF NIGERIAN ATHLETES AND NON-ATHLETES

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ABSTRACT

Efforts to adopt strategies to overcome sudden cardiac death among our young athletes is of utmost importance and is one of the most discussed issues among researchers concern all over the world today. The purpose of this study was to screen Nigerian athletes and non-athletes with the view of identifying abnormalities in their Electrocardiogram. Resting 12-lead electrocardiograms (ECGs) was used to screen a total of 89 subjects comprising of athletes from different sporting discipline; 20 long distance runners, 20 footballers, 15 basketballers, 7 weightlifters, 7 boxes, aged (mean ± SD 21.5 ± 5.16, range 13-40) and 20 non-athletes, aged (23.1±2.50,19-28). Anthropometrical measurement and blood pressure measurement were performed. Eighty-nine Nigerian athletes and non- and athletes were used for this study. The footballers had the largest number of abnormalities of 95% point to cardiac adaptations. The t-'test showed 5% significant between the athletes and the non-athletes indicating the similarity of other work done on the study by other researchers.

Keywords: Athletes; Non-Athletes; Identification; Abnormalities; Electrocardiogram.

Introduction

ECG (electrocardiogram) is a test that measures the electrical activity of the heart. The heart is a muscular organ that beats, in rhythm to pump the blood throughout the body. The signals that make the hearts muscle fibers contract comes from the Sino atrial node, which is the natural pacemaker of the heart. In an ECG test, the electrical impulses made while the heart is beating are recorded and usually shown on a graph paper. This is known as an electrocardiography and records any problems with the heart's rhythms: the abnormal conduction of cardiac impulses, which may suggest underlying cardiac or metabolic disorders, evidence of the occurrence of a prior heart attack(myocardial infarction); evidence of an evolving acute heart attack; evidence of abnormal blood electrolytes (potassium, magnesium); evidence of inflammation of the heart or its lining (myocarditis pericarditis and certain congenital heart from various heart pressures, and thyroid conditions) and the evidence of an impairment to blood to flow to the heart during an episode etc. A high proportion of athletes undergoing competitive level of sports training are likely to have abnormal ECG recordings, majority of these are benign and related to the

physiological adaptation to extreme levels of exertion. Right ventricular strain appears commonest than previously reported (Sukunbi, 2021). According to Moro & Culasso, (2000), Electrographic abnormalities include first degree heart block, right and left ventricular contractions, nonspecific T-wave changes and evidence of ventricular hypertrophy. Sunkunbi, (2021), also reported that black ethnicity has an independent predictor of abnormal ECG findings among athletes and their frequencies.

Materials and Method

Materials: Eighty-nine subjects were used in this study, they were between the ages of 13 and 38, 20 non-athletes (Normal) and 69 athletes which included, 20 footballers, 7 weightlifters, 7 boxers, 15 basket ballers, 20 long distance runners. The apparatus used in the laboratory test were:

(1) AT 1 (12 channel) ECG machine (SCHILLER-AG); (2) Graph paper;(3) Methylated spirit; (4) Sterilized blade; (5) Towel; (6) Cotton wool; (7) Manual inflation sphygmomanometer (model HEM-412C) Omron (USA); 8) Electrode paste (KYGEL); (9) An Automatic; (10) Standiometer SECA (Germany) and (11) Couch

Method: The subjects were practically undressed, their blood pressure taken before the commencement of the test. Specialized female assistants helped out with measurement for the female subjects. The subjects were then laid on the comfortable couch in a relaxed supine position. The required part of the body, which the limb leads were to be placed, was shaved with sterilized blade, in the case of hairy subjects. The parts of the body were then cleaned with swabbed cotton wool. The electrode gel was applied on the cleaned clean surfaces. The subjects were assured that the procedure was noninvasive and completely painless and takes less than a minute to perform once the leads are in position. In recording ECG, the principles of Einthoven was observed. The bipolar limb leads were attached to the limbs as follows: Electrodes on left arm (LA) and right arm (RA) both at the wrist, the left leg (LL) and right leg (RL) were attached a little bit above the malleus

The precordial chest leads V_1-V_6 were placed as follows:

- Lead V_1, on the fourth intercostal space at the sternal margin.
- Lead V_2 on the fourth intercostal space at the right sternal margin.
- Lead V_3 mid-way between lead V_3, and V_4.
- Lead V_4 on the fifth intercostal space at the horizontal level of lead V_4.
- Lead V_6 was placed on the mid axillary line at the horizontal level of lead V_4.

The electrocardiographic machine was standardized to record at 25.0mmls and 10mm/mv, the subjects were conformed to be relaxed before the commencement of the recording

Precautions

Experimental Ethics: In keeping to experimental ethnics the consent of the subjects was gotten from them after explaining the purpose of the experiment. Emphasis on the safety of the insulated cables

during the experiment. Following the ECG experimental precautions to avoid abnormalities in results, leading to inappropriate interpretation. The following precautions were observed:
(1) The subjects were laid on a comfortable couch. (2) There was good contact between the skin and the electrode, to obtain optimum result, by the application of electrode gel on the surface of their skin. (3) It was ensured the subjects had no metallic or any electronic equipment in them during the experiment, to avoid artifacts in the ECG. (4) The recording machine were grounded to avoid alternating current interference, by the use of lead IV. (5) The electrocardiography machine was connected to an automatic voltage regulator, as any electric power fluctuation would lead to a faulty interpretation. The measurements were done before the exercise and the values taken as the **control** while the post exercise recordings were taken as **test**. The **pretest** and **posttests** results were subjected to statistical t- test to obtained inferential conclusions

Results /Analysis

The main outcome of measurement was the identification of any abnormality in the ECG pattern of athletes and non-athletes. Statistical analysis were performed using the SPSS statistical software version 17.0(spss inc Chicago, IL USA), Kolmogorov-Smirnoff test was used with the student's t-test test for significant difference between means. The result indicated abnormal patterns 62.3 percent of the athletes and 25 percent of controls. Training related ECG findings occurred in thirteen percent of athletes and twelve percent of controls. Athletes and non-athletes had eleven percent prevalence of training unrelated ECG patterns respectively. In this study left ventricular hypertrophy was the most common ECG abnormalities among the athletes with males having higher prevalence of ECG abnormal presence of ECG abnormality compared to the females' athletes.

Athletes had a high percentage abnormal ECG than non-athletes (62.32% VS 25%). Abnormalities found in both athletes and non-athletes were: Sinus bradycardia (20.20% VS 2.78%), incomplete right bundle branch block (4.76% VS 2.78%), left bundle branch block (4.76% VS 2.78%), right bundle branch block (4.76% VS 2.78%), left ventricular hypertrophy (4.76% VS 2.78%), right ventricular hypertrophy (4.76% VS 2.78%), and non-specific intraventricular block (4.76% VS 2.78%). In athletes, atrial flutter (4.76%), T abnormality in leads (15.47%), ST elevation and depression associated with myocardial or pericardial damage (16.67%) and infarction (5.95%), premature atrial complexes (1.19%). First degree atrioventricular block (3.57%), Wolff-Parkinson-White syndrome (WPW type B) (7.14%), anteroseptal ischemia or left ventricular strain (1.19%). In non-athletes sinus tachycardia (2.78%) and sinus arrhythmia (2.78%) were found.

The study showed ECG features that accompany athletic conditioning and abnormalities in athletes and non-athletes.

RESULT SHOWING THE OUTCOME OF ECG COMPARISM

S/N		CONTROL BEFORE	CONTROL AFTER	TEST BEFORE	TEST AFTER	RESULT
1	PR	157.00 ± 4.75	156.19 ± 5.59	159.44 ± 3.29	143.94 ± 7.78	Non-significant
2	QRS	99.75 ± 0.73C	100.31 ± 0.50 c,d	104.19 ± 1.53 a,b	105.19 ± 1.56 b	Significant
3	QT	364.56 ± 5.13	365.06 ± 4.17	370.00 ± 4.21	368.69 ± 4.44	Non-significant
4	QTC	400.66 ± 4.04C	410.75 ± 3.71 c	422.13 ± 3.03 a,b	422.75 ± 4.14 a,b	Significant
5	P	63.31 ±3.51 c,d	66.81± 3.06 c,d	45.22± 3.69 a,b	46.63± 4.14 a,b	Significant
6	QPS	45.41 ± 4.61	48.78 ± 4.24	50.38 ± 4.11	53.97 ± 4.19	Non-significant
7	T	34.69 ± 3.13	38.31 ± 2.83	39.03 ± 1.46	39.13 ± 1.43	Non-significant
8	RV5	1.57 ± 0.10d	1.33 ± 0.04d	1.66 ± 0.05d	1.63 ± 0.05a,b,c	Significant
9	SV1	-1.53 ± 0.10c	-1.39 ± 0.14c	-1.04 ± 0.06a,b	-1.07 ± 0.02.71	Significant
10	RV5 + SV1	3.13 ± 0.11 c	2.89 ±0.09 c	2.71 ±0.08 a,b	±0.08	
11	N/A/B	4.69 ± 0.16	4.81 ± 0.11	4.88 ± 0.13	4.63 ± 0.19	

Values are represented as Mean ± Standard Error
Values are significant at $P \leq 0.05$
Significant with control before = a
Significant with control after = b
Significant with test before = c
Significant with test after = d

Discussion and Conclusion

The results of this study shows that some of the Nigerian athletes and non-athletes had some abnormality in their heart. Many abnormal patterns on an ECG may be non-specific, meaning that it may be observed with a variety of different conditions. They may even be a normal variant and not reflect any abnormality at all. It has been advocate by several researchers that that more findings are requires to UN ravel effects of racial differences in performances and the utilization of different assessment tools during pre-participation of cardiovascular screening in athletes (Williams et al 2019). Ozo, et al (2020), reviewed the importance of ethnicity on cardiac adaptation in athletes of various origins and highlighted some ECG changes known to be more commonly found in black athletes such as higher prevalence of ventricular hypertrophy and repolarization changes. It has been observed that, a good

number of the athletes in this study spent an average of 3hrs per week training in sporting activities on regular basis. The index population among young athletes within structured curriculum. The level of abnormal ECG findings in this study is similar to previously documented work among young athletes and controls. Accordingly, Chalrles, et al (2013), also utilized the same guidelines used in their study. Lastly, the limit of the ECG machine is that it is a static picture and may not reflect severe underlying heart problems at a time when the patient is not having any symptoms. The most common example of this is in patient with a history of intermittent chest pain due to severe underlying coronary artery disease. This patient may have an entirely normal ECG at a time when there is no experimenting symptoms. In such instances, ECG as recorded during an exercise stress test may reflect an underlying abnormality while ECG taken at rest may be normal. Furthermore, for a wider cardiac disease test there should the inclusion of the echocardiogram exercise stress test and the history of the patients should be made available.

However, some established facts about the Nigeria athletes and non-athletes heart were made as well, for instance the t-test between the footballers and the non-athletes shows significant difference in their means at alpha = 5% this result other athletes apart from the footballers also had the 5% significant as well.

Conclusion

This ECG recording in the Nigerian athletes and non-athletes is such that, cardiac adaptations were observed in most of the athletes that had longer training experience. The feasibility of a mass ECG screening within a city and a multiple ethnic black population has been demonstrated in the study. Some other athletes had normally or showed only minor alterations, however a variety of abnormal ECG patterns occurred in the overall athletes. Hence alterations are mostly seen in athletes engaged in high intensity dynamic endurance sports such as football.

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