Original Article

ECG finding in Sudanese athletes: A Pilot Study

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Abstract

Background: Sudden deaths of young competitive athletes are tragic events that continue to have a considerable impact on the medical communities which raised the need for a pre-participation cardiovascular screening as a systematic practice of medically evaluating large, general populations of athletes for the purpose of identifying abnormalities that could provoke disease progression or sudden death

Objectives: The aim of the study was to detect ECG changes among Sudanese athlete

Material and Methods: The study was a descriptive crossectional study including 30 Sudanese male athletes and 20male control subjects matched with age .The exercisers were grouped according to the type of exercise performed to static, dynamic, and mix type of exercise. Each group included 10 subjects .Their age ranged between 18-30 years. All subjects included in the study were clinically evaluated and an ECG record was obtained.

Results: significant sinus bradycardia in athletics groups was observed. The mean [±SD] PR interval in control subjects and athletes was 0.18 [±.011] ms and 0.20 [±.010] ms respectively ($p < .005$). Comparisons among groups revealed significant prolongation in PR interval in the dynamic exercisers (mean0 .22 ms) when compared to control subjects, the static and mix exercisers. The QT interval was prolonged among dynamic exercisers when compared with the other athletes and the control subject ($p<.008$).

Conclusions: there was sinus bradycardia in all groups of athletes. A statistically significant prolongation of the PR, QT and RR intervals among dynamic type of exercise in comparison to different types of exercise was obtained. A pre participations ECG screening is recommended to be performed for all Sudanese athletes before participation in any competitive exercise

Key wards: PR Interval, QT interval, bradycardia.

Under intense physical exertion, athletes may die suddenly which was found to be related to unsuspected inherited or congenital abnormalities in the heart. The most common abnormalities reported were hypertrophic cardiomyopathy and congenital malformations of the coronary arteries[1]. Less commonly, sudden cardiac death has been caused by arrhythmogenic right ventricular dysplasia, myocarditis, premature coronary artery disease, long QT and Wolf-Parkinson-White syndromes, aortic rupture in Marfan's syndrome, mitral valve prolapse, and aortic stenosis[1, 2].

It has been recommended that pre participation cardiovascular screening should be confined to a thorough history and physical examination, but recently non-invasive testing using ECG and echocardiography has been found to further enhance the diagnostic yield[3,4].

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Material and Methods

The study populations include 30 male competitive athletes in Khartoum state, Age between 18-30 years. All subjects were free from any symptoms of cardiovascular diseases, diabetes mellitus, hypertension, congenital heart diseases, ischemic heart disease or family history of cardiac diseases. The exercise must be performed for more than 15 hours per week[4]. A written consent was obtained from each subject under the study.

Athlete from three sport disciplines were assessed and grouped into three deferent categories according to the type of exercise performed.

First group included 10 participants who were performing static exercise. Weight lifters were selected as representative of this group .The second group were performing both dynamic and static exercise. Ten boxers were selected to represent this type of exercise and labeled as mixed group.

The third group was the dynamic exercise. Ten cyclists were selected as representative to this type of exercise. All subjects were normotensive with diastolic pressure less than 90mmHg and systolic pressure less than150mmHg.

The control subjects were 20 volunteer males. There ages ranging between 18-30 years. The control subjects had a relatively sedentary life style, arbitrarily defined as less than two hours exercise a week[5].They were clinically assessed to exclude cardiovascular diseases.

Methods: The data were recorded using a power lab data acquisition system ML760[6].

The study was carried out with the subjects awake, in the supine position, and in the post absorptive state. Participants were asked to refrain from drinking coffee, tea or cola products for 12h before the tests. Lead II in the ECG was recorded and PR, QT, R-R intervals were calculated.

The PR interval was defined as prolonged if more than (0.20) ms[5,7].

The QT interval was defined as prolonged if more than 0.450 ms[8, 9].

For measuring the RR interval the QRS wave was converted to continuous lines of instantaneous heart period then the cycle's variable measured.

The collected data were analyzed using SPSS program. The p value was considered as significant when it was < 0.05.

Results

Athletes were found to have significant sinus bradycardia with significant prolongation of the PR interval (table1). There was significant prolongation of the Qt interval in all three groups of athlete compared with the control group (table1).

Comparisons among the three different athletes as shown in (table 2, 3, 4) result in significant different between the dynamic exercisers group in relation to the static and mixed group in the three variables PR, QT, cycle variable.

Table 1 The PR, QT and RR intervals in athletes groups and control subjects

Value (mean+SD)	Control	Static	Dynamic	Mix
PR(ms)	0.18±.011	0.20±.010*	0.22.0±22*	0.20.0±14*
QT(ms)	0.36.0±17	0.44±.015*	0.44.0±43*	0.42.0±10*
RR(ms)	0.82.09±1	0.88±.076	0.81.09±5*	0.88.0±67*

*indicates significant difference compared to control subject (p<.05)

Table2 Comparison of PR, QT, RR in static group to mix and dynamic group

The interval	Exercise group	P value
PR	dynamic	.006 *
	mixed	.546
QT	dynamic	1.000
	mixed	0.167
RR	dynamic	.647
	mixed	.863

Table3 Comparison of PR, QT, RR intervals in dynamic group to static and mixed

The interval	Exercise group	P value
PR	mixed	.001*
	static	.006*
QT	static	1.000
	mixed	.167
RR	static	.647
	mixed	775

Table4 Comparison of PR, QT, RR intervals in mixed group to static and dynamic

The interval	Exercise group	P value
PR	dynamic	.001*
	static	.546
QT	static	.167
	dynamic	.167
RR	static	.863
	dynamic	.775

Discussion

The study showed a significant prolongation of the QT intervals in athletes (mean ± SD 0.44±.043 ms) when compared with the control group (mean 0.36±.015ms). The duration of the QT interval in Sudanese athletes was similar to that reported[9, 10] .Two athletes had QT interval longer than 0.50 ms but there were no T wave inversion or any cardiovascular symptoms or family history of sudden death suggesting long QT syndrome[9].

There were no atrial or ventricular ectopic waves in the recorded ECGs. No changes in ST segment (ST depression or elevation) was observed which goes with the literature[11].

There was a significant prolongation in the PR interval in the dynamic group (mean ± SD 0.22± .02ms) in relation to static and mixed group (0.20 ±.019 ms, .19±.012 ms respectively). There were four athletes with PR interval of 0.23 ms indicating feature of first degree heart block. None of the subjects had second degree heart block or any type of arrhythmias which were also infrequent finding in the European athletes[5, 7].

The RR interval in dynamic group was significantly longer in relation to the static and mixed group (P value .006)

None of the athlete had abnormal QRS configuration which was reported in the other athletes[10-12].

None of the athlete had LBBB or RBBB or change in the axis deviation which was a common finding in Italian foot ball players[5].

On comparing the different groups (table 2,3and 4) there were a significant difference between the dynamic group and the two other group in the PR, QT, RR intervals. Further investigation like echocardiography may show any structural changes in their hearts.

None of the athletes had an ECG screening before participation in exercise which is obligatory for any competitive professional player in other countries[2, 5, 8].

Conclusions

There was sinus bradycardia among Sudanese athletes compared with control subjects with concomitant prolongation of the PR and QT intervals without any feature of underlying structural cardiac disease.

The dynamic exercise was found to be significantly differing from other type of exercises with prominent sinus bradycardia and prolonged QT intervals.

ECG screening is highly recommended before any national or international competition.

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