CARDIOVASCULAR RISK STRATIFICATION IN YOUNG AND MASTER ATHLETES: PREPARTICIPATION SCREENING QUESTIONNAIRE

Estratificação de risco cardiovascular no atleta jovem e veterano: questionário de pré-participação

Estratificación del riesgo cardiovascular en deportistas jóvenes y veteranos: cuestionario de pre-participación

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ABSTRACT

Background: for any preparticipation evaluation, a questionnaire that reviews personal history of signs and symptoms and family history can identify athletes at cardiovascular risk of sudden cardiac death. **Objectives**: cardiovascular risk stratification using a preparticipation questionnaire in young and master athletes; evaluation of the perception of the importance of preparticipation screening among these two groups. **Methodology**: cross-sectional observational quantitative study, with data collection using a preparticipation questionnaire. Sample consisting of 66 athletes, 36 young athletes and 30 master athletes. Statistical analysis using the IBM® SPSS Statistics version 27.0 program. **Results**: a significant difference was observed in the gender between young and master athletes (ρ=0,047), time of federated sports practice (ρ=0,022), type of sport practiced (ρ=0,002), reasons for performing ECG (ρ=0,002), prescription of cardiac exam by a doctor in the past (ρ=0,025). No significance was observed in the family history and in the perception of the importance of the preparticipation evaluation between the two groups. **Conclusions**: the older the age, the more cardiac alterations may be present and more often athletes in this age group resort to health services to perform cardiac exams. The athletes showed a great perception of the importance of the preparticipation evaluation, as well as the electrocardiogram. A careful assessment of athletes should not be dismissed taking into account their age.

Keywords: athlete; sudden cardiac death; physical exercise; aging

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RESUMO

Enquadramento: para qualquer avaliação de pré-participação, um questionário que analise o histórico clínico pessoal de sinais e sintomas e história clínica familiar pode identificar atletas em risco cardiovascular de morte súbita cardíaca. **Objetivos**: estratificação do risco cardiovascular com recurso a questionário de pré-participação em atletas jovens e veteranos; avaliar a perceção da importância do exame médico-desportivo entre estes dois grupos. **Metodologia**: estudo observacional transversal quantitativo, com recolha de dados recorrendo a preenchimento de questionário de pré-participação. Amostra constituída por 66 atletas, 36 atletas jovens e 30 atletas veteranos. Análise estatística com recurso ao programa IBM® SPSS Statistics versão 27.0. **Resultados**: verificou-se diferença significativa no sexo entre atletas jovens e veteranos (ρ=0,047), tempo de prática desportiva federada (ρ=0,022), tipo de desporto praticado (ρ=0,002), razões para realização de eletrocardiograma (ρ=0,002), prescrição de exame cardíaco por médico no passado (ρ=0,025), não se tendo verificado qualquer significância na história familiar e na perceção da importância do exame médico-desportivo entre os dois grupos. **Conclusão**: quanto maior é a idade, mais alterações poderão estar presentes a nível cardíaco e mais vezes os atletas nessa faixa etária recorrem aos serviços de saúde para realizar exames cardíacos. Os atletas demonstraram ter uma grande perceção em relação à importância do exame médico-desportivo, bem como do eletrocardiograma. Não se deve dispensar a avaliação criteriosa dos atletas tendo em conta a sua idade.

Palavras-chave: atleta; morte súbita cardíaca; exercício físico; envelhecimento

RESUMEN

Marco contextual: para cualquier evaluación de pre-participación, un cuestionario que revise el historial clínico personal de signos y síntomas y el historial clínico familiar puede identificar a los atletas con riesgo cardiovascular de muerte cardíaca súbita. **Objetivos**: estratificación del riesgo cardiovascular mediante cuestionario pre-participación en deportistas jóvenes y veteranos; evaluar la percepción de la importancia del chequeo médico-deportivo entre estos dos grupos. **Metodología**: estudio observacional transversal cuantitativo, con recogida de datos mediante cuestionario de pre-participación. Muestra compuesta por 66 atletas, 36 atletas jóvenes y 30 atletas veteranos. Análisis estadístico mediante el programa IBM® SPSS Statistics versión 27.0. **Resultados**: fue verificada diferencia significativa en el sexo entre los deportistas jóvenes y veteranos (ρ=0,047), tiempo de práctica deportiva federada (ρ=0,022), tipo de deporte practicado (ρ=0,002), motivos para realizar electrocardiograma (ρ=0,002), prescripción de un examen cardíaco por un médico en el pasado (ρ=0,025), no comprobándose significancia en los antecedentes familiares y en la percepción de la importancia del chequeo médico-deportivo entre los dos grupos. **Conclusión**: cuanto mayor es la edad, más alteraciones se pueden presentar a nivel cardíaco y con mayor frecuencia los atletas de este grupo de edad recurren a los servicios de salud para realizarse exámenes cardíacos. Los deportistas mostraron una gran percepción de la importancia del chequeo médico-deportivo en su práctica deportiva, así como del electrocardiograma. No se debe descartar una valoración cuidadosa de los deportistas teniendo en cuenta su edad.

Palabras clave: atleta; muerte súbita cardíaca; ejercicio físico; envejecimiento

INTRODUCTION

The sports medical screening (SMS), also known as a preparticipation physical evaluation, refers to the practice of a regular screening of athletes before they take part in training and competitions (Corrado et al., 2011). The main aim of the SMS is to identify athletes suspected of having cardiovascular diseases and to prevent sudden cardiac death (SCD) during sports practice by using appropriate interventions (Corrado et al., 2011). In view of the growing number of federated athletes in a wide variety of sports where the physical activity is intense and regular, it has become almost essential to carry out preparticipation assessments for cardiovascular risk stratification.

In addition to the physical assessment, an effective evaluation of the athlete's personal medical history is a simple but effective first-line screening approach and should contain a discussion of recent previous illness and physiological/pathological conditions, including information on the level of physical activity, intensity and type of sport performed (Krutsch et al., 2020). Warning signs and symptoms, particularly when related to physical exercise, can be easily screened using a specific questionnaire (Krutsch et al., 2020). The presence of cardiovascular disease and/or unexplained SCD in family members, especially when associated with younger age and exercise, should be investigated (Krutsch et al., 2020).

There is an increased risk of adverse cardiovascular events during vigorous physical activity in master athletes (≥35 years) involved in high-level recreational and competitive athletics, with coronary artery disease (CAD) being the leading cause of SCD in this group (Barbara et al., 2016). Due to this increased risk, it is important to question the master athlete about specific symptoms and family history of cardiovascular disease (Barbara et al., 2016). In young athletes (<35 years), the majority of SCD events are due to genetic heart muscle diseases such as hypertrophic cardiomyopathy and arrhythmogenic right ventricular cardiomyopathy, followed by congenital coronary artery anomalies, myocarditis, aortic rupture due to Marfan syndrome, electrical conduction defects and valvular diseases (namely aortic stenosis and mitral valve prolapse) (Corrado et al., 2017).

The aim of this study consists in the stratification cardiovascular risk using a preparticipation questionnaire in young and master athletes and the assessment of the importance given to sports medical screening among these two groups.

FRAMEWORK/THEORETICAL FOUNDATION

To better characterize the term "*athlete*" for future scientific studies, a definition based on medical and sports research was proposed. Quoting Araújo & Scharhag (2016): "*The minimum criteria for an individual to be defined as an active athlete (all must be met) are:*

1.Practices a certain type of sport and trains with the aim of improving his performance/results;

2.Actively participates in sports competitions;

3.Is formally registered in a local, regional or national federation;

4.Has sports training and competition as their main activity (way of life) or as a focus of personal interest, dedicating several hours on all or most days to these activities, exceeding the time allocated to other types of professional or recreational activities." (p. 6)

Due to the increased mediatization of the "athlete" and their supposedly excellent physical condition, a

sudden death event in these individuals is a major media event with a major social impact. Defined as an unexpected and sudden cardiac death in a structurally normal heart, which usually occurs within an hour of the onset of symptoms in individuals without prior suspicion of any life-threatening condition (Asif & Harmon, 2017), SCD is the leading cause of mortality in athletes during sports practice, mainly due to structural and genetic cardiac alterations (Drezner et al., 2017).

More than 90% of all exercise-related SCD events occur in master athletes (Parry-Williams et al., 2021). As CAD is the most common cause of SCD in athletes in this age group (Barbara et al., 2016), it is important to question the individual about specific symptoms (such as: angina, syncope or pre-syncope during or after exertion; more fatigue than normal; dyspnoea; palpitations) and determine if there is family history of cardiovascular disease (Maron et al., 2007).

The clinical history detects more abnormalities than the physical examination (Lammlein et al., 2018), however the majority of cardiac alterations associated with a higher risk of SCD are suggestive or identified by abnormalities present in the resting 12-lead electrocardiogram (ECG) (Drezner et al., 2017), which is why the use of this test as a first-line tool is increasingly becoming a viable option for the early detection of cardiac alterations at risk of SCD in athletes, when implemented in preparticipation physical assessments, in addition to the normal physical assessment and questionnaire completion (Harmon et al., 2015a).

METHODOLOGY

This study has a quantitative cross-sectional observational typology. Data was collected using a randomised convenience sampling approach as an alternative to a formal sample calculation, based on the availability and accessibility of participants from the target population. Data collection took place between October 2022 and February 2023. All the individuals submitted to this study corresponded to the classification of "athletes" according to Araújo & Scharhag's (2016) definition of this term.

The inclusion criteria were: young federated athletes between 18 and 34 years; master federated athletes aged at least 35 years. Exclusion criteria were: athletes federated less than a year; individuals implanted with pacemaker or implantable cardioverter-defibrillator.

The questionnaire "*Preparticipation Physical Evaluation Monograph, Fourth Edition*" (PPE-4) (American Academy of Family Physicians [AAFP] et al., 2012) was used as the based preparticipation questionnaire for the personal and family medical history questions, to which questions about the individual's perception of the sports medical screening and the ECG were added.

The variables studied were as follows: age; gender; length of time practicing sport in general; length of time practicing federated sport; type of sport practiced; ECG evaluation in the past; reasons for ECG evaluation in the past; perception of the importance of the ECG (measured in different degrees of importance - very important; important; some importance; little importance); personal medical history of symptoms during practice; family medical history of death/heart disease; perception of the SMS with the study.

In order to test the distribution of the data, the Kolmogorov-Smirnov normality test was applied and only non-parametric variables were obtained. A quantitative descriptive analysis was carried out, calculating means, standard deviation, minimum and maximum values and absolute data. Associations between numerical and ordinal non-parametric variables were analysed using the Mann-Whitney test and binominal non-parametric variables using the Chi-square test, both with a significance level of $p \leq 0,05$ and a 95% confidence interval. The variables obtained through data collection were coded using the *software* IBM® SPSS Statistics version 27.0.

The design and respective protocol of this study was evaluated and received approval from the Ethics Committee of the institution where the study was carried out (permit number 68/CE-IPCB/2022). All the athletes included in this study were fully informed about the collection and processing of clinical data and signed the Informed Consent form, in accordance with the institution's policy.

RESULTS

A total of 66 athletes answered the questionnaire, of which 36 were young athletes (18-34 years) (54.5%) and 30 were masters (≥35 years) (45.5%).

Table 1 shows all the variables studied in the assessment of sports practice. In this assessment, significance was observed in: number of male and female athletes ($p=0,047$), length of time federated sport practice ($p=0,022$) and type of sport practiced ($p=0,002$).

Table 1

Sports practice assessment

SPORTS PRACTICE ASSESSMENT				
QUESTIONS		Young Athletes	Master Athletes	*p-value*
Age (mean value)		22,5 ± 3,8 years	49,1 ± 7,7 years	-------
Gender (n (total %))	Male	22 (61,1%)	25 (83,3%)	***p=0,047***
	Female	14 (38,9%)	5 (16,7%)	
Time of general sports practice (n (total %))	1 to 3 years	0 (0,0%)	3 (10,0%)	*p=0,563***
	4 to 6 years	4 (11,1%)	3 (10,0%)	
	7 to 10 years	8 (22,2%)	5 (16,7%)	
	More than de 10 years	24 (66,7%)	19 (63,3%)	
Time of federated sports practice (n (total %))	1 to 3 years	0 (0,0%)	4 (13,3%)	***p=0,022****
	4 to 6 years	6 (16,7%)	9 (30,0%)	
	7 to 10 years	8 (22,2%)	5 (16,7%)	
	More than de 10 years	22 (61,1%)	12 (40,0%)	
Hours of sports practice in a week (n (total %))	Less than 2h	2 (5,6%)	0 (0,0%)	*p=0,122***
	2h to 4h	4 (11,1%)	9 (30,0%)	
	4h to 8h	13 (36,1%)	13 (43,3%)	
	More than 8h	17 (47,2%)	7 (23,4%)	
	Didn´t respond	0 (0,0%)	1 (3,3%)	

Type of practiced sport (n (total %))	Individual Sport	14 (38,9%)	23 (76,7%)	ρ=0,002*
	Collective Sports	22 (61,1%)	7 (23,3%)	

*Chi-square test, **Mann-Whitney U-test

Table 2 details all the variables studied in the evaluation of the athletes' perception of the ECG in the SMS. In this assessment, there was significance in the reasons for ECG´s evaluation in the past (ρ=0,002).

Table 2

Perception of the ECG in the SMS assessment

PERCEPTION OF THE ECG IN THE SMS ASSESSMENT				
QUESTIONS		Young Athletes	Master Athletes	*ρ-value*
ECG evaluation in the past (n (total %))	Yes	35 (97,2%)	29 (96,7%)	ρ=0,896*
	No	1 (2,8%)	1 (3,3%)	
Reason for ECG evaluation in the past (n (total %))	SMS	29 (80,5%)	13 (43,3%)	ρ=0,002**
	Routine	3 (8,3%)	9 (30,0%)	
	SMS + Routine	2 (5,6%)	2 (6,7%)	
	Occupational medicine	0 (0,0%)	2 (6,7%)	
	Occupational medicine + Routine	0 (0,0%)	2 (6,7%)	
	Didn´t respond	1 (2,8%)	1 (3,3%)	
	N/A	1 (2,8%)	1 (3,3%)	
Acknowledgement of the importance of the ECG in the athlete's physical assessment (n (total %))	Yes	35 (97,2%)	29 (96,7%)	ρ=0,896*
	No	1 (2,8%)	1 (2,8%)	
Degree of the importance given to the ECG in the athlete's physical assessment (n (total %))	Very important	30 (83,3%)	24 (80,1%)	ρ=0,687**
	Important	4 (11,1%)	3 (10,0%)	
	Some importance	1 (2,8%)	1 (3,3%)	
	Little importance	0 (0,0%)	0 (0,0%)	
	Didn´t respond	0 (0,0%)	1 (3,3%)	
	N/A	1 (2,8%)	1 (3,3%)	

ECG: *electrocardiogram*, N/A: *non applicable*, SMS: *sports medical screening*, *Chi-square test*, **Mann-Whitney U-test*

Table 3 shows all the variables studied in the assessment of the athletes' personal medical history. In this assessment, there was a significant difference in the history of prescription of a cardiac exam by a doctor (ECG or echocardiogram) (ρ=0,025).

Table 3

Athletes' personal medical history

ATHLETES' PERSONAL MEDICAL HISTORY				
QUESTIONS		Young Athletes	Master Athletes	*ρ-value*
Discomfort, pain, tightness or pressure on the chest during exercise (n (total %))	Yes	7 (19,4%)	2 (6,7%)	*ρ=0,132**
	No	29 (80,6%)	28 (93,3%)	
Fainting or near-fainting during or after exercise (n (total %))	Yes	5 (13,9%)	3 (10,0%)	*ρ=0,630**
	No	31 (86,1%)	27 (90,0%)	
Light headedness or more shortness of breath than normal during exercise (n (total %))	Yes	2 (5,6%)	0 (0,0%)	*ρ=0,190**
	No	34 (94,4%)	30 (100,0%)	
Fast and irregular heartbeat during exercise (n (total %))	Yes	3 (8,3%)	1 (3,3%)	*ρ=0,397**
	No	33 (91,87)	29 (96,7%)	
Cardiovascular pathology in the past (n (total %))	Yes	2 (5,6%)	3 (10,0%)	*ρ=0,497**
	No	34 (94,4%)	27 (90,0%)	
Type of cardiovascular pathology in the past (n (total %))	Heart murmur	2 (5,6%)	2 (6,7%)	*ρ=0,483***
	High cholesterol	0 (0,0%)	1 (3,3%)	
	N/A	34 (94,4%)	27 (90,0%)	
Doctor's ban or restriction on playing sport (n (total %))	Yes	4 (11,1%)	0 (0,0%)	*ρ=0,060**
	No	32 (88,9%)	30 (100,0%)	
Prescription of cardiac exam by a doctor (ECG or echocardiogram) (n (total %))	Yes	14 (38,9%)	20 (66,7%)	***ρ=0,025***
	No	22 (61,1%)	10 (33,3%)	
Unexplained seizure episode (n (total %))	Yes	0 (0,0%)	1 (3,3%)	*ρ=0,270**
	No	36 (100,0%)	29 (96,7%)	

ECG: *electrocardiogram*, N/A: *non applicable*, SMS: *sports medical screening*, *Chi-square test, **Mann-Whitney U-test

Table 4 details all the variables studied in the assessment of the athletes' family medical history. In this assessment, there were no significant differences between young and master athletes.

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Table 4

Athletes' family medical history

ATHLETES' FAMILY MEDICAL HISTORY				
QUESTIONS		Young Athletes	Master Athletes	*p-value*
Death of family member due to heart problems or unexpected death <50 years (n (total %))	Yes	8 (22,2%)	3 (10,0%)	*p=0,185**
	No	28 (77,8%)	27 (90,0%)	
Family member with loss of physical and/or psychological abilities due to heart disease <50 years (n (total %))	Yes	3 (8,3%)	0 (0,0%)	*p=0,106**
	No	33 (91,7%)	30 (100,0%)	
Family member with known cardiac pathology (HCM, Marfan syndrome, ARVC, long QT syndrome, short QT syndrome, Brugada syndrome, CPVT or other clinically significant arrhythmia) (n (total %))	Yes	2 (5,6%)	1 (3,3%)	*p=0,666**
	No	34 (94,4%)	29 (96,7%)	
Family member with a genetic heart condition (n (total %))	Yes	5 (13,9%)	4 (13,3%)	*p=0,948**
	No	31 (86,1%)	26 (86,7%)	
Family member with heart problems, PM or ICD (n (total %))	Yes	9 (25,0%)	4 (13,3%)	*p=0,235**
	No	27 (75,0%)	26 (86,7%)	
Family member who had an episode of unexplained fainting, unexplained seizure or near drowning (n (total %))	Yes	4 (11,1%)	0 (0,0%)	*p=0,060**
	No	32 (88,9%)	30 (100,0%)	

ARVC: *arrhythmogenic right ventricular cardiomyopathy*, CPVT: *catecholaminergic polymorphic ventricular tachycardia*, HCM: *hypertrophic cardiomyopathy*, ICD: *implantable cardioverter-defibrillator*, PM: *pacemaker*, *Chi-square test*

Table 5 details the athletes' perception of SMS after undergoing the study. In this evaluation, there were no significant differences between young and master athletes.

Table 5

Athletes' perception of SMS after undergoing the study

ATHLETES' PERCEPTION OF SMS AFTER UNDERGOING THE STUDY				
QUESTIONS		Young Athletes	Master Athletes	*p-value*
Better understanding of the importance of sports medicine assessment with this study (n (total %))	Yes	36 (100,0%)	27 (90,0%)	*p=0,054***
	No	0 (0,0%)	1 (3,3%)	
	Didn´t respond	0 (0,0%)	2 (6,7%)	

SMS: *sports medical screening*, **Mann-Whitney U-test*

DISCUSSION

Most "at-risk athletes" do not experience premonitory symptoms – the SMS represents the only strategy capable of identifying potential cardiovascular disease (Corrado et al., 2011). The importance of early identification of clinically silent cardiovascular diseases at a pre-symptomatic stage depends on the concrete possibility of preventing SCD through lifestyle changes, including restricting sports activity (if necessary), but also through prophylactic treatment using pharmaceutical strategies and implantable cardioverter defibrillator implantation (Corrado et al., 2011).

In general, men tend to exercise, play sport or engage in other sport activities more often than women, especially at younger ages (European Commission, 2018), which may justify the disparity in the gender of athletes found during data collection. This disparity is particularly marked in the 15 to 24 years age group, with males practicing exercise or sports on a regular basis considerably more than females (European Commission, 2018). In addition, there is evidence of a reduction in adherence to participation in physical activities in individuals aged 17 and 18 years-old, usually associated with the start of university education, as well as the increased demands associated with this level of education and the possible relocation from their usual place of residence (Quesado et al., 2020). The amount of regular activity practiced tends to decrease with age, however the gender gap in sports practice tends to decrease in older age groups (European Commission, 2018). In this study, the opposite was true, with a higher percentage of female athletes among young people than among masters.

This study confirmed that the vast majority of master athletes practice individual sports, corroborating the literature which has shown that older athletes have a greater preference for practising individual sports (Jenkin et al., 2017). Master athletes take part in sport to improve their health, but at the same time, due to the decline in general health with ageing, the appearance of health problems can be a barrier to participation (Jenkin et al., 2017).

Many young athletes started their federated practice at a very young age and have greater physical capacities and more free time to maintain this practice, which is usually linked to a higher level of competition and training intensity. Master athletes, on the other hand, usually start their federated sports practice later and don't have as much time for this type of training compared to their younger counterparts. That said, the significance revealed in relation to the length of time spent practising sport at a federated level between young and master athletes could be justified.

In regard to athletes´ perceptions of SMS, this study has shown that it has helped to improve their understanding of the subject, as many athletes have already undergone SMS and have a positive opinion of this type of screening. The literature seems to corroborate this positive perception of athletes towards SMS, showing that the vast majority believe that SMS prevents/helps detect physical alterations, making them feel safer in their sports practice after being examined, while also recommending that other athletes undergo this examination (Solberg et al., 2012; Hill et al., 2023), although a small minority of this population admits to feel nervous when they are examined. For athletes with negative reactions to SMS, it is imperative that appropriate resources are made available and routine follow-up examinations are

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carried out to mitigate possible consequences (Solberg et al., 2012).

The sensitivity of the resting 12-lead ECG has been shown to be much higher than personal and family medical history and physical examination (Harmon et al., 2015b). In addition, the ECG false positive rate (6%) was lower than that of personal and family medical history (8%) and physical examination (10%) (Harmon et al., 2015b). The ECG is an effective strategy for detecting cardiovascular disease in athletes and the sole use of personal and family medical history and physical examination as a screening tool should be re-evaluated (Harmon et al., 2015b). The addition of the ECG to the SMS seems to gain more strength when analysing the perception of the athletes who took part in this study regarding this exam, with 94,4% of young athletes and 90,1% of master athletes considering the ECG to be at least "important" for their physical assessment, being that, within these percentages, 83,3% of young athletes and 80,1% of master athletes considered the ECG to be "very important".

Despite of having a high level of physical fitness, master athletes can present a high cardiovascular risk, especially in the presence of CAD (Morrison et al., 2018). The realization that the older they get, the more likely they are to have heart problems may prompt master athletes to resort to health services to undergo more routine exams more often when compared to younger athletes, justifying the significant differences in the reasons for ECG evaluation and the prescription of cardiac exam by a doctor found in this study.

The literature is clear on the likelihood of predicting CAD when, during the SMS, a high Framingham risk score, significant q waves on the ECG, exertional dyspnoea and a family medical history of premature CAD are present, with these alterations showing a greater positive predictive value (Morrison et al., 2018). A high Framingham risk score was the best predictor of CAD in master athletes and proves that its incorporation into the preparticipation SMS algorithm should be considered, while the ECG can raise suspicions and/or diagnose asymptomatic disease (Morrison et al., 2018). Symptoms noted on the preparticipation questionnaire such as angina, syncope or pre-syncope during or after exertion, more fatigue than normal, dyspnoea or palpitations may be specific symptoms of CAD in master athletes (Barbara et al., 2016).

For any preparticipation assessment, attention should be paid to signs and symptoms and family history that can identify athletes at risk (Campbell et al., 2009), hence the great importance of carrying out preparticipation questionnaires during SMS. The literature shows that many of the heart diseases known to cause SCD can present with symptoms of syncope, pre-syncope, chest pain, dyspnoea, palpitations or seizures (Campbell et al., 2009). A family history of SCD, unexplained drowning, near drowning, road traffic accidents or seizures may also be present (Campbell et al., 2009). Knowing that many of the diseases that cause SCD (usually paediatric) are genetic, identifying even a first asymptomatic family member can reveal a more extensive family involvement (Campbell et al., 2009). Greater attention to detail in personal medical history, family medical history and physical examination is fundamental to the success of any detection strategy (Campbell et al., 2009).

CONCLUSION

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The older one gets, the more cardiac alterations are likely to be present and the more often athletes in this age group resort to health services for exam evaluations, justifying the significance of the reasons for ECG evaluation and the prescription of cardiac exams by a doctor. The athletes showed a high level of awareness of the importance of medical examinations in their sports practice, as well as the electrocardiogram, the test that proved most effective in detecting cardiac alterations. There were no major differences in personal and family history between young and master athletes, but a careful assessment of athletes should not be dispensed with considering their age, due to the greater risk of certain pathologies in each age group.

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