South Health and Policy. 2024; 3:110
doi: 10.56294/shp2024110

SHORT COMMUNICATION

SQTL and competitive sports: a challenge for medicine in Latin America

SQTL y deporte competitivo: un reto para la medicina en América Latina

Eduardo Dizioli Perez[1]

[1]Universidad Abierta Interamericana, Facultad de Medicina y Ciencias de la Salud, Carrera de Medicina. Buenos Aires, Argentina.

Cite as: Dizioli Perez E. SQTL and competitive sports: a challenge for medicine in Latin America. South Health and Policy. 2024; 3:110. https://doi.org/10.56294/shp2024110

Submitted: 04-07-2023 **Revised:** 13-10-2023 **Accepted:** 06-02-2024 **Published:** 07-02-2024

Editor: Dr. Telmo Raúl Aveiro-Róbalo

Corresponding Author: Eduardo Dizioli Perez

ABSTRACT

The QT interval, measured on the ECG, represented the time of ventricular depolarisation and repolarisation, and its prolongation indicated a risk of serious arrhythmias or sudden death. In athletes, this prolongation was sometimes observed as a physiological adaptation, although in certain cases it responded to pathologies such as Long QT Syndrome (LQTS). As competitive sport became more professional in Latin America, concerns grew about latent cardiac conditions, especially after sudden deaths in elite athletes. The diagnosis of prolonged QT required detailed evaluations, as intense training altered normal heart parameters. The lack of standardised protocols, systematic screening and access to advanced technology made it difficult to detect LQTS, increasing the risk in genetically susceptible populations. Despite some advances in education and partial reforms, inequalities in cardiac care persisted, making prolonged QT a medical and social challenge.

Keywords: QT; Athletes; Sudden Death; Diagnosis; Intense Training.

RESUMEN

El intervalo QT, medido en el ECG, representó el tiempo de despolarización y repolarización ventricular, y su prolongación indicó riesgo de arritmias graves o muerte súbita. En atletas, dicha prolongación se observó a veces como una adaptación fisiológica, aunque en ciertos casos respondió a patologías como el Síndrome de QT Largo (SQTL). A medida que el deporte competitivo se profesionalizó en América Latina, crecieron las preocupaciones sobre condiciones cardiológicas latentes, especialmente tras muertes súbitas en deportistas de élite. El diagnóstico del QT prolongado requirió evaluaciones detalladas, debido a que el entrenamiento intenso alteró parámetros normales del corazón. La falta de protocolos homogéneos, cribados sistemáticos y acceso a tecnología avanzada dificultó la detección del SQTL, incrementando el riesgo en poblaciones genéticamente susceptibles. A pesar de algunos avances en educación y reformas parciales, persistieron desigualdades en la atención cardiológica, lo que convirtió al QT prolongado en un desafío tanto médico como social.

Palabras clave: QT; Deportistas; Muerte Súbita; Diagnóstico; Entrenamiento Intenso.

BACKGROUND

The QT interval, measured on an electrocardiogram (ECG), represents the time of ventricular depolarization and repolarization. Its prolongation may indicate a risk of torsades de pointes, syncope, or even sudden death.[1,2] While some athletes have a slight QT prolongation as a physiological adaptation to training, this prolongation may be pathological, as in Long QT Syndrome (LQTS).[3]

As competitive sports become more professional in Latin America, latent cardiac conditions are becoming more relevant.[4] Several sudden deaths among elite athletes have raised alarm bells among federations, medical teams, and sports cardiologists in the region. Therefore, understanding how competitive sports can influence or aggravate QT abnormalities in this context is vital to protecting athletes' health.[5]

The QT interval is measured from the start of the QRS complex to the end of the T wave. It is adjusted to the heart rate using formulas such as Bazett or Fridericia, yielding the corrected QT (QTc). Values greater than 450 ms in men and 460 ms in women are considered prolonged.[5,6,7,8]

Intense training induces cardiac adaptations such as ventricular hypertrophy and sinus bradycardia. These adaptations can alter the duration of the QT, with a slight prolongation considered normal in well-trained athletes. However, differentiating between a physiological variation and a pathology requires detailed evaluation.[9,10]

SQTL can be congenital or acquired. In both cases, exercise can trigger it, especially in high-intensity sports such as soccer, athletics, swimming, or cycling.[3]

Mutations in genes such as KCNQ1, KCNH2, or SCN5A are involved in congenital SQTL variants. Some forms manifest predominantly during exercise (LQT1), others at rest, or during emotional stress.[12,13,14]

The use of medications (antipsychotics, antibiotics, antihistamines), electrolyte disturbances, or doping substances can induce QT prolongation in athletes.[15]

Studies on long QT in Latin American athletes are scarce. However, cases of sudden death linked to QT abnormalities have been identified in countries such as Brazil, Argentina, Colombia, and Mexico.[16]

The ethnic diversity of Latin America implies a wide range of genetic susceptibilities. For example, specific polymorphisms in ion genes are more common in populations of African descent, who also have a higher prevalence of exercise-related sudden death.[17,18]

The lack of systematic screening and the limited culture of pre-competitive ECG testing contribute to underestimating the true prevalence of QT abnormalities in athletes.[19]

Although some federations require cardiological evaluations, protocols vary widely between countries. In many cases, resting ECG and stress testing with QT monitoring are not included.[20]

Sudden death in young soccer players in Brazil, Argentina, and Peru has been the subject of postmortem investigation, revealing previously undiagnosed QT abnormalities. These cases have prompted partial reforms in sports evaluation protocols.[20,21]

Electrocardiography (ECG) remains the fundamental tool, but its interpretation in athletes requires experience to differentiate normal adaptations from pathological signs.[22]

Genetic analysis can confirm congenital SQTL in suspicious cases. However, access to these studies in Latin America is limited and expensive.[23]

QT monitoring during exercise testing can reveal dynamic prolongations that are not evident at rest.[24]

Treatment of SQTL includes beta blockers, discontinuation of QT-prolonging drugs, correction of electrolyte imbalances, and even implantation of automatic defibrillators (AEDs) .[25]

In some instances, especially with a history of syncope or exercise-induced arrhythmias, avoiding high-intensity sports is recommended. This poses ethical and personal dilemmas for young athletes deciding to give up their careers.[26]

The coverage and quality of sports medicine varies dramatically between countries and between levels of competition (professional vs. amateur). This prevents the timely detection of cases of prolonged QT.[27]

There is no regional regulation establishing minimum cardiovascular assessment criteria for athletes, leaving the responsibility in the hands of clubs or coaches, who often have no medical training.[28,29]

More and more universities are incorporating sports cardiology training. However, further training and access to modern diagnostic technology are still needed.[30]

QT prolongation represents a serious, though often silent, risk in competitive sports.[31] In Latin America, underdiagnosis and the lack of uniform strategies increase the danger, especially in young athletes.[32] Implementing systematic cardiac evaluation policies, improving access to complementary studies, and providing medical and sports education are fundamental pillars for mitigating this risk.[33]

This phenomenon should not be viewed solely from a clinical perspective but also as a challenge for public health, social justice, and the development of safe sports. Latin America has the opportunity to move toward more preventive, inclusive, and evidence-based sports medicine, thereby safeguarding the lives and futures of its athletes

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FUNDING

None.

CONFLICT OF INTEREST

None.

AUTHOR CONTRIBUTION

Conceptualization: Eduardo Dizioli Perez.
Writing – original draft: Eduardo Dizioli Perez.
Writing – review and editing: Eduardo Dizioli Perez.