

Sudden Cardiac Death in Athletes: Big Trouble, Not So Little Asia

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The review by Dr. Halabchi, et al^[1] is an excellent summary and reiteration of the importance of the addition of ECG screening to the pre-participation exam (PPE) for athletic competition. To pioneer this campaign in Asia, is a noble endeavor and is no small feat. As highlighted by this review, the general consensus for enforcing ECG as a requisite for participation varies greatly by the governing bodies making the suggestions and the demographic which they represent. The controversies most commonly discussed in the literature are the issues of lack of consensus for how to advise patients with ECG aberrations, false positive tests and the negative implications of such results; and cost effectiveness of mass screening. Not only does this manuscript briefly confront these topics, it also raises novel ideas regarding the unique milieu within the Asian cohort that may affect the risks for sudden cardiac death.

In evaluating the natural history of ECG recommendations, the pendulum has shifted from one extreme to the other in support or dissent with mandating ECGs to the PPE. Since the incorporation of the ECG in Italy in 1986 by law, the prevalence of athletic SCD death decreased by nearly 90% in a small part of Italy and was attributed mostly to early identification of arrhythmogenic right ventricular dysplasia (ARVD)^[2]. On the contrary, the Israeli experience^[3] showed neither utility nor cost effectiveness. Despite the Israeli National Sport Law implementation in 1997, there was no difference in incidence of SCD in athletes before or after required athlete ECG screening. This may be a consequence of the Israeli

population not being subject to the most common causes traditionally associated with athlete SCD that would be identified on ECG (hypertrophic cardiomyopathy, dilated cardiomyopathy, valvular heart disease, ARVD, long QT syndrome, Brugada's Syndrome). It may be that Israeli athletes die from causes such as Marfan's Syndrome, anomalous coronary arteries, catecholamine related arrhythmias, or commotio cordis, which would not be detected by a resting ECG. However, as the Israelis demonstrate, serial studies of the addition of ECG screening suffer from the wide variation in sport related deaths from year to year and that a randomized trial is needed.

Perhaps another explanation for the disparity between the Italians and Israelis is the cultural and genetic differences of the populations studied in different countries. Genetic variation within a *single* country may explain the US experience with ECG as a part of the PPE. North America's genetic heterogeneity in the proverbial "melting pot" is so vast, that until recently there has been limited uniformity in the athletic populations being studied. Despite the immense genetic variability in the States, recent data from Drezner et al suggests that underreporting of sports related SCD^[4] makes addition of the ECG even more cost effective^[5,6].

The main issue to keep in mind with the Halabchi paper is that this is a review for the entire Asian cohort, which includes countries as far west as the Middle East, Indonesia to the southeast, Russia to the north, Japan to the east, and everything in between. For years, it has been established that different subgroups of Asians have varying leading causes for SCD. For example,

South and Southeast Asians suffer from various iterations of arrhythmogenic sudden cardiac death (Pokkuri, Bangungut, Sudden Unexpected Nocturnal Death Syndrome) [7] which may or may not all be variations of LQTS or Brugada Syndrome, all thought to be genetic in nature. On the other hand, there are retrospective analyses that suggest that cultural variations, environmental factors, emotional stressors, nutritional deficiencies (i.e. folate), and even climate/seasonal changes (peaks in December-January) may affect risks for SCD [8]. Interestingly, when removed from such conditions, the incidence of SCD in the same population decreases [9-11]. Additionally, the sports of interest within the different Asian countries vary widely, as mentioned by Halabchi. As we have recently reported, abnormalities noted on ECG are sport specific [12] so one would expect differing physiologic and ECG changes associated with martial arts, Kabbadi (Indian field sport with elements of wrestling), and cricket. Unfortunately, the implications of the ECG

abnormalities for these sports and the causes of SCD have yet to be determined.

To this end, no unifying mandates could reasonably be recommended for “Asians” when considering the variability of genetics, environment, and cultures that this broad term encompasses. However, we certainly support that ECG mandates should be country or region specific (ie Middle East, South Asian, Southeast Asian, East Asian, Eurasian, etc) rather than inclusive over a continent. This literature review from Halabchi et.al should serve as a call to action for other agencies within Asia to evaluate their specific risks and adverse events. Potentially, as more *individual* studies are completed, we may have a better *universal* understanding of these catastrophic adverse events that plague our young athletes.

Key Words: Sudden Cardiac Death; Physical Examination; Athletes

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