

## Sex Difference of the Incidence of Sudden Cardiac Arrest/Death in Athletes: A Systematic Review and Meta-analysis

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**Abstract :** Background: The risk of sudden cardiac arrest/death (SCA/D) in athletes is controversial. There is a lack of meta-analyses assessing the sex differences in the risk of SCA/D in competitive athletes. Purpose: The aim of the present study was to evaluate sex differences in the incidence of SCA/D in competitive athletes using meta-analyses. Methods: The systematic review was registered in the PROSPERO database (registration ID: CRD42023432022) and was conducted according to the PRISMA guidelines. PubMed, Embase, Scopus, SPORT Discus and Cochrane Library were searched up to July 2023. To avoid systematic bias in data pooling, only studies with data for both sexes were included. Results: From the 18 included studies, 2028 cases of SCA/D were observed (males 1821 (89.79%), females 207 (10.21%)). The age ranges from the adolescents (<26 years) to the elderly (>45 years). The incidence in male athletes was 1.32/100,000 AY (95% CI: [0.90, 1.93]) and in females was 0.26/100,000 AY (95% CI: [0.16, 0.43]), the incidence rate ratio (IRR) was 6.43 (95% CI: [4.22, 9.79]). The subgroup synthesis showed a higher incidence in males than in females in both age groups <25 years and ≤35 years, the IRR was 5.86 (95% CI: [4.69, 7.32]) and 5.79 (95% CI: [4.73, 7.09]), respectively. When considering the events, the IRR was 6.73 (95%CI: [3.06, 14.78]) among studies involving both SCA/D events and 7.16 (95% CI: [4.93, 10.40]) among studies including only cases of SCD. The available clinical evidence showed that cardiac events were most frequently seen in long-distance running races (26, 35.1%), marathon (16, 21.6%) and soccer (10, 13.5%). Coronary artery disease (14, 18.9%), hypertrophic cardiomyopathy (8, 10.8%), and arrhythmogenic right ventricular cardiomyopathy (7, 9.5%) are the most common causes of SCA/D in competitive athletes. Conclusion: The meta-analysis provides evidence of sex differences in the incidence of SCA/D in competitive athletes. The incidence of SCA/D in male athletes was 6 to 7 times higher than in females. Identifying the reasons for this difference may have implications for targeted the prevention of fatal events in athletes.

**Keywords :** incidence, sudden cardiac arrest, sudden cardiac death, sex difference, athletes

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