Sudden Cardiac Death Among Firefighters ≤45 Years of Age in the United States

Justin Yang, MD, MPH,a,b Dennis Teehan, MD, MPH,a,b Andrea Farioli, MD,a,b,c Dorothee M. Baur, MD, MS,a,d Denise Smith, PhD,e and Stefanos N. Kales, MD, MPH,a,b,g

Sudden cardiac death (SCD) is the leading cause of death in firefighters. Although on-duty SCD usually occurs in older victims almost exclusively because of coronary heart disease, no studies have examined causation across the career span. In the present retrospective case-control study, cases of SCD in young (aged ≤45 years) firefighters from the National Institute for Occupational Safety and Health fatality investigations (n = 87) were compared with 2 age- and gender-matched control groups; occupationally active firefighters (n = 915) and noncardiac traumatic firefighter fatalities (n = 56). Of the SCD cases, 63% were obese and 67% had a coronary heart disease–related cause of death. The SCD victims had much heavier hearts (522 ± 102 g) than noncardiac fatality controls (400 ± 91 g, p <0.001). Cardiomegaly (heart weight >450 g) was found in 66% of the SCD victims and conveyed a fivefold increase (95% confidence interval [CI] 1.93 to 12.4) in SCD risk. Furthermore, hypertension, including cases with left ventricular hypertrophy, increased SCD risk by 12-fold (95% CI 6.23 to 22.3) after multivariate adjustment. A history of cardiovascular disease and smoking were also independently associated with elevated SCD risk (odds ratio 6.89, 95% CI 2.87 to 16.5; and odds ratio 3.53, 95% CI 1.87 to 6.65, respectively). In conclusion, SCD in young firefighters is primarily related to preventable lifestyle factors. Obesity entry standards, smoking bans, and improved screening and/or wellness program are potential strategies to reduce SCD in younger firefighters. © 2013 The Authors. Published by Elsevier Inc. All rights reserved.


The leading mode of duty-related death among US firefighters is sudden cardiac death (SCD), which accounts for about 50% of on-duty firefighting fatalities.1–6 About 90% of these SCD cases will be attributable to coronary heart disease (CHD) and usually occur in firefighters aged >45 years.4–7 In addition, emerging evidence has suggested that obesity and left ventricular (LV) hypertrophy and/or cardiomegaly are present in a large proportion of all those with SCD (with and without CHD) in firefighters8 and the general population.9 Although SCD causation in younger subjects, such as athletes, is usually due to non-CHD structural pathologic features,10,11 little is known about SCD in young firefighters. We conducted a case-control study of SCD among firefighters aged ≤45 years to examine the associated cardiovascular disease (CVD) risk factors and underlying pathologic features. Our aims were to (1) describe the specific pathologic-anatomic causes of on-duty SCD in these cases, (2) compare the prevalence and severity of CVD risk factors in SCD fatalities with those in healthy, occupationally active firefighter controls, and (3) compare the cardiac findings from the SCD cases at autopsy with those of firefighters who died of on-duty noncardiac causes.

Methods

We conducted a retrospective case-control study that serially reviewed and selected as cases all SCD fatalities (aged ≤45 years) from 1996 to 2012 investigated by the National Institute for Occupational Safety and Health (NIOSH).12 Two other firefighter groups were chosen as controls: (1) age-matched, career firefighters examined from 2007 to 200911 and (2) age-matched, noncardiac, traumatic fatalities (2004 to 2010) with autopsy reports available.

NIOSH conducts independent investigations of firefighter line-of-duty deaths, and the completed fatality reports are publicly available for download from NIOSH’s Firefighter Fatality Investigation and Prevention Program website.12 Two physician investigators (J.Y. and D.T.) examined in detail all fatality reports published online from January 1996

0002-9149/13 - see front matter © 2013 The Authors. Published by Elsevier Inc. All rights reserved.
http://dx.doi.org/10.1016/j.amjcard.2013.08.029