Association of Occupational Noise Exposure with Cardiovascular Diseases among Career Firefighters in Northern California, USA

Dal Lae Chin, RN, PhD, OiSaeng Hong, RN, PhD, FAAN, FAAOHN

University of California San Francisco, School of Nursing, San Francisco, CA

Introduction

- Cardiovascular disease (CVD) is the leading cause of on-duty death among firefighters (FFs).
- Exposure to excessive noise is associated with CVD in occupational settings.
- FFs are routinely exposed to high levels of intermittent noise as part of their jobs, and thus may be at risk for increased CVD.
- Little is known about a link between noise exposure and CVD among FFs.

Purpose

- To examine the association between occupational noise exposure and CVD among career FFs.

Methods

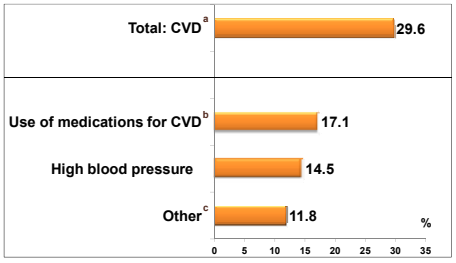
- Cross-sectional epidemiology study
- 152 FFs in California, U.S.A
- Web-based survey data: Demographics/work factors, noise factors (hearing status and noise exposure) , and CVD.
- Data analysis: SPSS version 23

Results

Characteristics of the Participants

Characteristics	Mean ± SD or n (%)
Age (Years)	43.56 ± 10.26
Gender (Male)	151 (99.3)
Race/Ethnicity (White)	118 (77.6)
Years in the fire service	18.38 ± 9.67
Shift (48-hour)	93 (61.2)
Work hours per week (≥40hours)	140 (93.3)
Percent time in loud noise (> 50%)	35 (23.0)
Hearing loss (Yes)	30 (19.7)
Perceived hearing status (Poor/fair)	65 (42.8)
Tasks and jobs	
Fire Response	135 (88.8)
Medical Response	132 (86.8)
Administrative Duties	120 (78.9)
Training	137 (90.1)
Hazardous materials response	55 (36.2)
Technical Rescue	65 (42.8)
Fire Prevention	90 (59.2)
Community Outreach	87 (57.2)
Other Duties	59 (38.8)

Heart/Cardiovascular Health Problems



[a] Multiple choice
[b] Hypertensive, anti-arrhythmia medications, and anticoagulants, etc.
[c] Other: Arrhythmia, tachycardia, irregular heartbeat, palpitation, premature heartbeat, etc.

Results

Associations of Noise Factors with CVD

Characteristics	Unadjusted OR (95% CI)	Adjusted OR [a] (95% CI)
Perceived noise exposure (% time in noise)		
No louder	1.01 (0.99-1.03)	1.00 (0.98-1.02)
As loud as a vacuum	0.99 (0.96-1.04)	1.01 (0.96-1.06)
As loud as a gas lawnmower	0.97 (0.92-1.02)	0.97 (0.91-1.03)
As loud as a chainsaw	0.98 (0.93-1.03)	1.01 (0.95-1.06)
As loud or louder than a siren	0.99 (0.96-1.03)	1.01 (0.97-1.05)
Percent time in loud noise		
≤ 50% of the time	1.00	1.00
> 50% of the time	3.10 (0.98-9.82) †	3.29 (0.83-13.04) †
Noise exposure at work (% of the time)	1.00 (0.99-1.02)	1.00 (0.98-1.02)
Use of HPDs (% of the time)	0.99 (0.98-1.00)	0.99 (0.98-1.01)
Noise exposure outside of firefighting (% of the time)	0.98 (0.96-1.01)	0.99 (0.96-1.03)
Military service	0.33 (0.07-1.56)	0.15 (0.02-0.95)*
Hearing loss		
No	1.00	1.00
Yes	3.67 (1.60-8.40)**	3.18 (1.16-8.73)*
Perceived hearing status [b]		
Good	1.00	1.00
Bad	2.72 (1.33-5.57)**	2.24 (0.93-5.38) †
Non-occupational activities		
Shoot firearms for recreation (hunting, etc)	2.06 (1.02-4.19)*	3.22 (1.29-7.99)*
Ride snowmobiles or jet skis	0.25 (0.03-2.01)	0.05 (0.00-0.93)*
Operate lawn mower, leaf blower, or snow blower	1.51 (0.73-3.13)	1.50 (0.61-3.71)
Listen to loud music	0.74 (0.32-1.73)	1.13 (0.38-3.38)
Attend commercial sporting events, NASCAR, or other races	0.41 (0.11-1.47)	0.12 (0.02-0.72)*
Work on construction sites, in manufacturing, or in farming	1.02 (0.37-2.85)	0.66 (0.19-2.37)
Vehicle maintenance	0.73 (0.35-1.53)	0.56 (0.22-1.42)
Other	0.89 (0.42-1.88)	0.83 (0.32-2.21)

- [a] Multivariable logistic regression analyses adjusted for age, waist, physical activity, job title, ERI, and sleep apnea.
- [b] Bad: poor, fair; Good: good, very good, excellent
- † P<0.10, * P<0.05, ** P<0.01, *** P<0.001
- HPDs: Hearing Protective Devices

Conclusions

- The study showed FFs' noise factors were associated with CVD.
- Control of noise exposure in both occupational and non-occupational environments should be considered in designing effective health promotion programs for reducing CVD among FFs.
- As this is a pilot study with a small sample in northern CA, more studies with large samples are needed in well-designed epidemiological studies.

Acknowledgments

- Funding Source: Pilot Project Research Training Program of the Southern California National Institute for Occupational Safety and Health Education and Research Center funded by the Centers for Disease Control and Prevention (Grant number: T42 OH008412)
- Contact: Dal Lae Chin, RN, PhD
  Dal.Chin@ucsf.edu

UCSF University of California San Francisco

COEH CENTER FOR OCCUPATIONAL & ENVIRONMENTAL HEALTH