

KEY FINDINGS

High point-prevalence estimates (1 in 4 firefighters) of shoulder-, back- and knee-related MSDs among Canadian firefighters.
The period-prevalence of sprain/strain injuries were also noticeably high (1 in 10 firefighters).

Background

- Firefighters are at high risk of sustaining work-related injuries/trauma and this poses major threats to their health.¹⁻³
- Despite the decline in total number of work-related musculoskeletal disorders (MSDs) injuries among firefighters reported by the National Fire Information Database since 2005, the frequency remains high; 1.5 injuries per firefighter, per reported fire response event in Ontario, Canada.⁴
- Several individual studies have assessed the prevalence of MSDs among Canadian firefighters.
- While individual studies provide valuable insights, they fail 1) to elucidate both the geographical and anatomical distribution of the condition, 2) to compare subgroups, or 3) to pool similar studies to provide an estimate from which inferences can be drawn.

Objectives

- To critically appraise the quality of the body of literature that reports the prevalence of MSDs among Canadian firefighters; and
- To assess the point- and period-prevalence estimates of anatomical regions of MSDs among Canadian firefighters.

Methods

- Design: prospective or retrospective cross-sectional cohort studies;
- Participants: career/professional Canadian firefighters;
- Outcomes: point- and period-prevalence estimate of musculoskeletal disorders; and
- Musculoskeletal disorders: we defined musculoskeletal disorders as sprains or strains, fractures or dislocations, and self-reported bodily pain (chronic or acute).
- We conducted systematic electronic searches to identify relevant prospective or retrospective cross-sectional cohort studies in MEDLINE, EMBASE, PubMed, and Web of Science from inception until November 2018.

Results

- 5 studies were eligible to proceed to data extraction and analysis.
- 3 prospective, 2 retrospective were conducted between 2015 and 2018 and included 4143 firefighters.
- When focused on the pain in the head region, the point-prevalence estimate was **6.0%** (3 studies, 100 of 1491 firefighters, 95% CI: 3.00 to 10.00; I² = 87.00 %).
- In terms of neck pain, the point-prevalence estimate was **17.0%** (3 studies, 231 of 1491 firefighters, 95% CI: 12.00 to 22.00; I² = 86.00 %)
- For the shoulder pain, the point-prevalence estimate was **23.0%** (3 studies, 312 of 1491 firefighters, 95% CI: 15.00 to 33.00; I² = 94.00 %).
- Regarding elbow, arm and hand regions, the point-prevalence estimate of pain was **17.0%** (3 studies, 235 of 1491 firefighters, 95% CI: 8.00 to 27.00; I² = 96.00 %)
- In terms of back pain, the point-prevalence estimate was **27.0%** (3 studies, 367 of 1491 firefighters, 95% CI: 18.00 to 38.00; I² = 95.00 %)
- When focused on the pain in the upper thigh region, the point-prevalence estimate was **6.0%** (2 studies, 41 of 684 firefighters, 95% CI: 3.00 to 11.00; I² = 82.00 %)
- For knee pain, the point-prevalence estimate was **27.0%** (2 studies, 180 of 684 firefighters, 95% CI: 11.00 to 48.00; I² = 97.00 %).
- Regarding the foot region, the point-prevalence estimate of pain was **7.00%** (3 studies, 105 of 1491 firefighters, 95% CI: 6.00 to 8.00; I² = 0.0 %)
- In terms of all sprain/strain injuries (all body parts), the 1-year period-prevalence estimate was **10.0%** (2 studies, 278 of 2652 firefighters, 95% CI: 7.00 to 14.00; I² = 89.00 %)
- When focused on fractures/dislocations (all body parts), the 1-year period-prevalence estimate was **1.00%** (2 studies, 26 of 2652 firefighters, 95% CI: 0.70 to 1.40; I² = 4.50 %).

Results (continued)

Body part: Shoulder					
Gender (male) and Duration of Self-Reported MSD (past 1-week).					
Nazari (2019) [13]	68	272	50.00	25.00	20.00 – 30.60
Negm (2017) [4]	91	283	50.00	32.20	26.70 – 38.00
Total	159	555	100 %		
Random-effects model Heterogeneity I ² = 71.0 %				28.60	22.00 – 35.80
Gender (female) and Duration of Self-Reported MSD (past 1-week).					
Nazari (2019) [13]	24	118	82.00	20.30	13.50 – 28.70
Negm (2017) [4]	3	8	18.00	37.50	8.50 – 75.50
Total	27	126	100 %		
Random-effects model Heterogeneity I ² = 26.50 %				23.70	12.10 – 37.70

Body part: Back					
Subgroup Analysis Stratified by Gender (male) and Duration of Self-Reported MSD (past 1-week).					
Nazari (2019) [13]	84	272	49.00	31.00	25.40 – 36.70
Negm (2017) [4]	91	283	51.00	32.20	26.70 – 38.00
Total	175	555	100 %		
Random-effects model Heterogeneity I ² = 0.0 %				31.60	27.80 – 35.50
Subgroup Analysis Stratified by Gender (female) and Duration of Self-Reported MSD (past 1-week).					
Nazari (2019) [13]	39	118	66.00	33.00	24.70 – 42.30
Negm (2017) [4]	5	8	34.00	62.50	24.50 – 91.50
Total	44	126	100 %		
Random-effects model Heterogeneity I ² = 63.0 %				42.60	18.70 – 68.50

Body part: Knee					
Subgroup Analysis Stratified by Gender (male) and Duration of Self-Reported MSD (past 1-week).					
Nazari (2019) [13]	56	272	50.00	20.50	16.00 – 26.00
Negm (2017) [4]	107	283	50.00	38.00	32.10 – 43.70
Total	163	555	100 %		
Random-effects model Heterogeneity I ² = 95.0 %, P < 0.001				29.00	13.80 – 46.80
Subgroup Analysis Stratified by Gender (female) and Duration of Self-Reported MSD (past 1-week).					
Nazari (2019) [13]	14	118	63.00	12.00	6.60 – 19.10
Negm (2017) [4]	3	8	37.00	37.50	8.50 – 75.50
Total	17	126	100 %		
Random-effects model Heterogeneity I ² = 70.0 %, P = 0.06				21.00	3.00 – 48.80

Conclusion

- We found high point-prevalence estimates (1 in 4 firefighters) of shoulder-, back- and knee-related MSDs among Canadian firefighters.
- The point-prevalence of shoulder- and knee-related MSDs were higher in male firefighters, whereas head-, neck-, arm/elbow/hand-, back- and upper thigh-related MSDs were more prevalent in female firefighters.
- The period-prevalence of sprain/strain injuries were also noticeably high (1 in 10 firefighters).

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References: 1) Savall A, Charles R, Binazet J, Frey F, Trombert B, Fontana L, et al. Volunteer and Career French Firefighters With High Cardiovascular Risk: Epidemiology and Exercise Tests. J Occup Environ Med. 2018; 60(10): e548-e553. doi: 10.1097/JOM.0000000000001426. 2) Adetona AM, Adetona O, Gogal RM Jr, Diaz-Sanchez D, Rathbun SL, Naeher LP. Impact of Work Task-Related Acute Occupational Smoke Exposures on Selected Proinflammatory Immune Parameters in Wildland Firefighters. J Occup Environ Med. 2017;59(7):679-690. doi: 10.1097/JOM.0000000000001053. 3) MacDermid JC, Nazari G, Rashid C, Sinden KE, Carleton N, Cramm H. Two-month Point Prevalence of Exposure to Critical Incidents in Firefighters in a Single Fire Service. Work. 2019; In press. 4) Sinden KE, Lorbergs AL, MacDermid JC, Deschamps L. Firefighter Injuries Relative to Fire Response Characteristics. 2017. <https://cjcj.ufv.ca/firefighter-injuries-relative-to-fire-response-characteristics/>

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