

EPIDEMIOLOGY OF NECK INJURIES ACCOMPANYING SPORT CONCUSSIONS IN YOUTH OVER A 13-YEAR PERIOD IN A COMMUNITY-BASED HEALTHCARE SYSTEM

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ABSTRACT

Background: The same trauma that produces concussion may also produce neck injury. The signs of concussion and neck injury are similar, and symptoms after acceleration-deceleration trauma to the head-neck complex do not accurately discriminate between them. Research on the epidemiology of neck injury among sport-concussed youth is sparse.

Purpose: The purpose of this study was to investigate the epidemiology of diagnosed neck injury in non-sport-related concussion (Non-SRC) versus sport-related concussion (SRC) in youth by age, sex, and sport.

Study design: Cross-sectional epidemiologic study

Methods: De-identified data from community-based electronic health records over 13 years were extracted to analyze rates and characteristics of neck injuries among non-SRCs and SRCs in youth aged five to 21. Neck injury diagnosis prevalence rates and odds ratios were calculated to estimate risk of neck injury among concussed youth, comparing non-SRCs to SRCs by age and sex.

Results: Sixteen thousand, eight hundred eighty-five concussion records were extracted, of which 3,040 SRCs and 2,775 non-SRCs in youth aged five to 21 were identified by cross-filtering sport-related keywords (e.g., football, basketball, soccer, running, swimming, batting, horseback riding, skiing, etc.) with all ICD-9 and ICD-10 concussion codes. The prevalence of neck injuries diagnosed among SRCs (7.2%) was significantly different than the prevalence of neck injuries diagnosed among non-SRCs (12.1%, $p < 0.000$). Neck injury diagnoses were significantly more prevalent in females overall ($p < 0.000$) and among non-SRCs ($p < 0.000$). The prevalence of neck injury diagnoses was not significantly higher in concussed females versus concussed males with SRC ($p = 0.164$).

Among youth aged five to 21 exposed to concussions, non-SRCs were more likely to be accompanied by a neck injury diagnosis than SRCs (OR 1.66; 95% CI 1.39 to 1.98; $p < 0.000$). Similarly, female-to-male neck injury proportion ratios were significantly higher in females in non-SRCs compared to SRCs (IPR 1.90, 95% CI 1.60 to 2.25, $p < 0.000$).

Sports with highest prevalence of concussion differ from sports with highest prevalence of concussion-related neck injury in both sexes.

Conclusions: The overall prevalence of diagnosed neck injuries in youth was higher in non-SRCs compared to SRCs (12.1 vs. 7.2%, $p < 0.001$), with the highest prevalence at age 14 in both sexes. The risk of neck injury diagnosis accompanying concussion was significantly higher in females compared to males (6.1% difference; $p < 0.000$).

Key words: Cervical spine, concussion, epidemiology, movement system, neck injury, whiplash

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