

## Gender Differences in Clinical Presentation and Recovery of Sports-related Concussion

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**Background:** There has been increasing attention and understanding of sports-related concussions. However, research on gender differences in the clinical presentation of concussions and its impact on prolonged recovery in SRCs has been limited.

**Purpose:** To determine if gender plays a significant role in mechanism of sports injury, timing to access care, symptom severity/concussion features, and response to treatment in our Centre.

**Study Design:** Retrospective study.

**Methods:** Data was collected retrospectively for athletes presenting to a sports medicine concussion clinic between September 2014 to January 2016. The sample included 207 athletes who completed computerized neurocognitive testing and assessments on first presentation to clinic. A physician-led interdisciplinary team evaluated and treated each athlete until resolution of signs and symptoms, and clearance was given. Athletes were grouped by gender into acute (0-2 mo.), sub-acute (3-5 mo.) and chronic ( $\geq 6$  mo.) recovery time groups. An analysis by gender of age, injury mechanism, post-concussion symptoms, neurocognitive data, and concussion features was performed.

**Results:** A total of 207 athletes were evaluated for concussion. Females report higher scores on their intake post-concussion symptom scale than males ( $p < 0.0002$ ). No differences were found between males and females on other aspects of neurocognitive data. Clinically, females exhibited a higher total number of concussion features 4.5 to 3.6 ( $p < 0.00003$ ). A significant relationship exists between gender and migraine ( $p < 0.0002$ ), vestibular ( $p < 0.004$ ) and cervicogenic ( $p < 0.0002$ ). Vestibular was the most common feature of concussion in both genders. With respect to recovery, 34% of all males in our study were discharged within 0-2 months of injury date, compared to 12% of females. On the other hand, 35% of all Females continued to experience symptoms at  $\geq 6$  months. Overall, females showed a longer recovery period than males ( $p < 0.002$ ). Females who were discharged from the program and who required longer treatment ( $\geq 3$  months) were, on average, of a more mature age ( $23.8 \pm 13.2$ ) and presented later to clinic ( $t = 3.3 \pm 3.6$  mo). Discharged females who required treatment of  $\geq 6$  months also tended to report higher symptoms (PCSS =  $40.83 \pm 19.53$ ).

**Conclusion:** Medical professionals providing care to athletes with sports-related concussions can anticipate female athletes will present with higher post-concussion symptom scores and have more clinical features than their male counterparts. Mature females that present later in their recovery for concussion treatment will have a more protracted recovery. Athletes of both genders who seek care earlier in the injury process will have a shorter recovery.