The Effect of Concussion History on Lower Extremity Musculoskeletal Injury in Collegiate Athletes: A Critically Appraised Topic

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The majority of athletes who sustain a concussion experience documented recovery from self-reported symptoms, neurocognitive impairments, and balance dysfunction within 7-10 days post-injury.2 However, there is evidence to suggest that measurable neuromuscular deficits remain in athletes beyond clinical recovery of a concussion and exceed return to play criteria fulfillment.1,5

DEFICENCIES IN NEUROMUSCULAR CONTROL HAS BEEN ASSOCIATED WITH MUSCULOSKELETAL INJURY, BUT LIMITED RESEARCH HAS EXPLORED WHETHER NEUROMUSCULAR CONTROL INSUFFICIENCIES SECONDARY TO CONCUSSION ARE CORRELATED WITH RISK OF ORTHOPEDIC INJURY.3

FOCUSED CLINICAL QUESTION
Are collegiate athletes with a history of concussion at a higher risk of sustaining a lower extremity injury than collegiate athletes without a history of concussion?

SEARCH STRATEGY

Sources of Evidence Searched
Literature search was conducted in September 2019. Data sources searched included EBSCO Host ProQuest, SAGE Journals, SPORTDiscus, and Sacred Heart University Library. Search terms: (concussion) AND (lower extremity injury) AND (athletes). Studies were limited to academic and peer reviewed articles published in English after 2009.

Study Selection
Criteria for selection required that original studies: a) included information from participants for history of concussion as well as history of lower extremity injuries, b) determined the relationship between history of concussions and risk of lower extremity injuries in athletes, c) investigate collegiate athletes, d) were not meta-analysis or literature reviews, e) Were level 3 evidence or higher.

SUMMARY OF SEARCH, “BEST EVIDENCE” APPRAISED, AND KEY FINDINGS

Summary of Search and Best Evidence Appraised
- The search of the literature produced 12 articles relating to all search terms and search parameters.
- After review, four relevant studies met the inclusion criteria and were included.1-4
- All studies were critically appraised using the STROBE criteria.

Key Findings
- The odds of sustaining a lower extremity musculoskeletal injury were higher in athletes with a history of concussion.1-4
- Common injuries include ankle sprains, knee sprains, and lower extremity muscle sprains.1-4
- Athletes with a history of multiple concussions had greater odds of reporting knee injuries compared to controls.4
- There is inconsistent evidence regarding the correlation of history of concussion and lower extremity injury when comparing by sex. Houston et al.4 concluded that females with a history of concussion had greater odds of reporting an ankle sprain or knee injury than males with a history of concussion, while Herman et al.3 found no significant difference between lower extremity injury between males and females with a history of concussion.

RESULTS OF SEARCH

Table 1. Summary of Study Designs of Articles Reviewed.

<table>
<thead>
<tr>
<th>Author</th>
<th>Study Design</th>
<th>Level of Evidence*</th>
<th>STROBE Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brooks et al.,1</td>
<td>Cohort Study</td>
<td>3</td>
<td>19/22</td>
</tr>
<tr>
<td>Gilbert et al.,2</td>
<td>Cross Sectional</td>
<td>3</td>
<td>20/22</td>
</tr>
<tr>
<td>Herman et al.3</td>
<td>Observational Cohort Study</td>
<td>3</td>
<td>20/22</td>
</tr>
<tr>
<td>Houston et al.,4</td>
<td>Cross Sectional</td>
<td>3</td>
<td>20/22</td>
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*Level of evidence assessed using the Oxford Centre for Evidence-Based Medicine 2011 criteria.

REFERENCES


CLINICAL SCENARIO

Concussions can cause a multitude of both acute and chronic symptoms including headache, blurred vision, dizziness, nausea, double vision, memory loss, balance problems, cognitive and neurological dysfunction.1

Strength of Recommendation
Based on the consistent findings from level 3 evidence, a grade B strength of recommendation was made based on the Strength of Recommendation Taxonomy (SORT).

IMPLICATIONS FOR PRACTICE, EDUCATION, AND FUTURE RESEARCH

The results of this appraisal support the answer of the focused clinical question by identifying that having a history of concussion is correlated with an athlete’s increased risk of sustaining a lower extremity musculoskeletal injury. While the findings support a correlation between concussion history and rate of lower extremity injury, no causation was identified in the studies reviewed. It is possible that the increased injury rate is secondary to deficits in neuromuscular control, as they can persist beyond the standard recovery time and completion of standard concussion return-to-play protocols.5

Future research is not needed to determine the cause of the relationship between history of concussion and increased risk of lower extremity injury in order to assist clinicians in best managing an athlete’s return to play post concussion.