Does Strength Training Decrease the Risk of Sports Related Knee Injury?

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Does Strength Training Decrease the Risk of Sports Related Knee Injury?

Zachary Noll OMS-II, Quin Buob OMS-II

**Background**

- Knee are the most common sports related joint to be injured\(^1\).
- Approximately 2.5 million sports-related knee injuries are treated in the ED across the United States and 2 million ACL tears are repaired worldwide each year\(^1\).
- ACL tear is the most common injury among contact sport (football, soccer, basketball, and volleyball) athletes.
- Meniscus tears are common among non-contact sport (running) athletes.
- Approximately 23% of college athletes will experience a knee injury of some degree\(^2\).
- The sex of patient, type of activity, and body habitus (excess weight and muscle mass) all present well defined and different risks for knee injury.\(^3\)

**Significance**

- It is important to explore the possible beneficial effects of strength training to help avoid these injuries and prevent future injuries in a vulnerable population.
- While strength training has been shown to be crucial in the rehabilitation of knee injury, the connection between strength training and knee injury prevention is not well described.

**Methods**

- Relevant research published in the last 15 years was searched for using PubMed on 12/27/23.
- Articles were reviewed for background on sports related knee injuries and studies that evaluated the effects of strength training on knee injury prevention.

<table>
<thead>
<tr>
<th>Database</th>
<th>Search Terms</th>
<th># of Results</th>
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<tr>
<td>Pubmed</td>
<td>Strength training AND knee injury prevention</td>
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<tr>
<td>Pubmed</td>
<td>Core strength AND knee injury prevention</td>
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<td>Pubmed</td>
<td>Leg strength AND knee injury prevention</td>
<td>203</td>
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</table>

**Results**

<table>
<thead>
<tr>
<th>Training Method</th>
<th>Goal</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Combination of strength, running, and plyometrics</td>
<td>Decrease risk of ACL and overall knee injury</td>
<td>Decreased risk of both ACL injury and overall knee injury. More effective if started preseason rather than during the season</td>
</tr>
<tr>
<td>Core muscle strength training</td>
<td>Decrease risk of ACL injury</td>
<td>Decreased risk of ACL injury to due more ideal lower extremity muscle activation</td>
</tr>
<tr>
<td>Pelvic and core muscle strength training</td>
<td>Decrease risk of ACL injury</td>
<td>Decreased mechanical risk factors for ACL injury and improved jumping performance</td>
</tr>
<tr>
<td>3 exercise lower extremity pregame strength training</td>
<td>Decrease risk of injury</td>
<td>Decreased risk of noncontact, overuse, and ACL injuries</td>
</tr>
<tr>
<td>Isometric quadriceps contraction</td>
<td>Decrease risk of pain in patellar tendinopathy</td>
<td>Decreased knee pain incidence and maintenance of muscle strength in patellar tendinopathy</td>
</tr>
</tbody>
</table>

**Discussion**

- Different strength training protocols have been shown to decrease the risk of ACL tears, meniscus tears and pain with patellar tendinopathy.
- Increases in vastus medialis to vastus lateralis activation ratio, hamstring to quadriceps activation ratio, and a reduction in hip adduction and knee valgus from strength training decrease the risk of ACL tear.
- Both male and female athletes can benefit from strength training as a form of injury prevention\(^9, 10\).
- Though the best and most specific type of strength training has not been identified, the risk of injury decreases with a variety of training methodologies.
- It is unclear if the age of commencement of strength training impacts risk of injury.

**Future Directions**

- Determine specific exercises, frequencies, and intensities yield the best results for knee injury prevention.
- Determine the effectiveness of strength training in prevention of reinjury to the knee.
- Study different cleat/shoe types and assess the risk of knee injury.

**References**

Table 1: Effects of different strength training methods on knee injury risk\(^4, 5, 6, 7, 8\)