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

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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.

Database	Search Terms	# of Results
Pubmed	Strength training AND knee injury prevention	373
Pubmed	Core strength AND knee injury prevention	40
Pubmed	Leg strength AND knee injury prevention	203

Results

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

Table 1: *Effects of different strength training methods on knee injury risk* [4, 5, 6, 7, 8]

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 asses the risk of knee injury

References

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