How to Understand and Prevent Knee Injuries in the Female Athlete

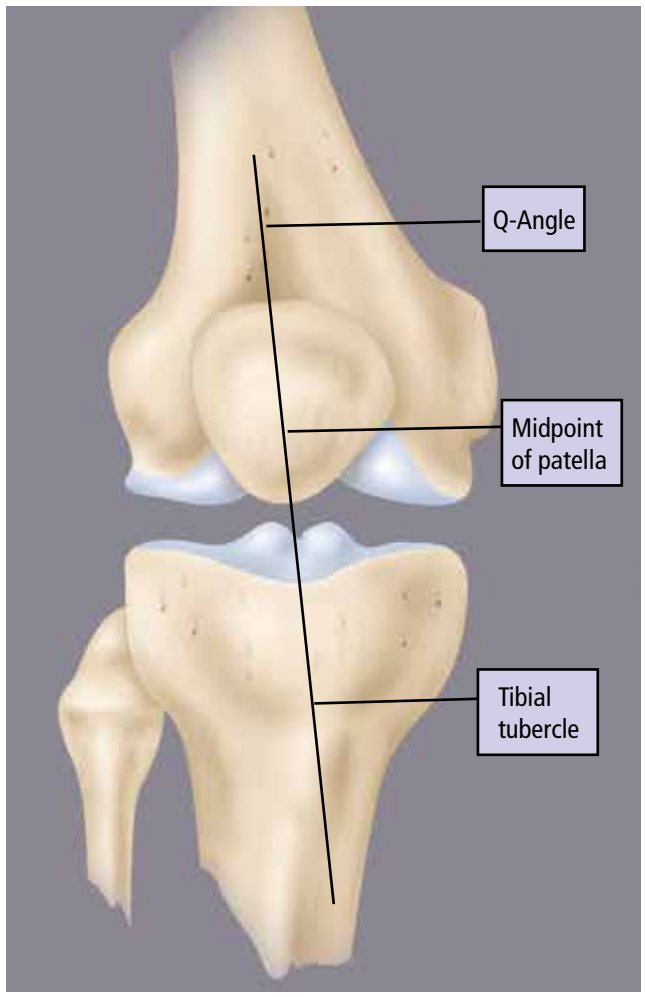
ABSTRACT

Knee injuries in female athletes is more common than in male athletes. There are many theories. Using these theories, prevention strategies are provided to ensure the incidence of such injuries decrease over time.

KEYWORDS: knee injuries, athletes, prevention, exercise

There are many studies and reports of increased incidence of knee injury in women athletes when compared to men in high-risk sports like soccer, basketball, and volleyball. These conditions include ACL tears, patellar subluxations/ dislocations, patellofemoral syndrome, and meniscal damage and overuse syndromes. Women are particularly more likely to sustain an ACL tear in sports. The incidence of significant knee injury among females is roughly five times higher per player per hour than for males. The majority of injuries occur in females aged 15-25, and researchers have long debated the reasons.

Initially, the research focused on the anatomical and hormonal differences among men and women. For example, women have greater pelvis widths, a larger "Q angle," greater hip varus, hip ante version, knee valgus and foot pronation. There are published studies that have found that women are three times more likely to injure their ACL during ovulation (when levels of estrogen peak)



Normal knee joint

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than during other times of their cycle. However, even though these biomechanics and hormonal factors may put the knee and certain ligaments at a disadvantage even before any jump or landing is ever made, none of theses studies could conclusively find a direct relationship to increased ACL tears.

ACL injuries appear to occur most frequently during deceleration activity such as a sudden stop, change in direction, or landing from a jump.

Further investigation revealed that a large proportion of knee injuries and 70% of ACL tears are noncontact injuries. This leads us to evaluating the neuromuscular forces involved. There have been reports of women having poor hamstring, gluteus medius, and calf muscle recruitment patterns, greater flexibility, poor patellar tracking, tend to use less hip and ankle musculature during sport and tend to land flat footed with the knee in extension rather than partial flexion. In particular, ACL injuries appear to occur most frequently during deceleration activity such as a sudden stop, change in direction, or landing from a jump. Therefore, eccentric strength and proprioception play a critical role. Women also turn and pivot in a more erect position, which also strains the ACL. All of these factors that can be influenced substantially through training and prevention strategies noted below.

If a knee injury does occur, it can often be successfully treated. Both operative and non-operative treatment options are available. Non-operative treatment can sometimes be used if the athlete is willing to reduce her athletic participation until adequately treated.

Prevention

1. Wearing high heels leads to short calf muscles and tendons. It is best to do regular daily calf stretching exercises and to wear low-heel shoes at times during the day.
2. Poor eating habits and eating disorders in some women does not support rigorous training regimens. It is best to eat 5-6 small meals with

Best to limit how often high heels are worn

A balanced diet consisting of carbohydrates, fat, and protein is important for supporting a rigorous training program

50% carbohydrates, 20% fat and 30% protein sources.

3. Aerobic fitness does not allow the supporting muscles to develop strength and stability, which would counteract the higher flexibility /instability of women. The advice would involve balancing strength training with aerobics at 50:50 alternate days and doing the stretching after strength exercises because most forms of stretching leave the muscle temporarily weaker. Women who can hyperextend either their knees or elbows beyond 180° should pay extra attention to the hamstrings and arm biceps (using hamstring curls and arm curls, respectively) in their strength-training program.
4. Practice proper landing technique (from a jump) and learn to do cutting maneuvers in a crouched posture with a slight bend at the knee and the hip should be reinforced.
5. Make strengthening exercises for the hamstrings and quadriceps muscles a regular part of your conditioning program. To stretch the quads, stand and use a wall or table for support. Lift one leg and pull your foot towards your buttocks. Hold for five seconds, then release the foot and stand straight. Repeat six to ten times on one side, then turn and repeat on the other side. To stretch the hamstrings, sit with one knee bent and

Strengthening exercises should be part of a regular conditioning program

SUMMARY OF KEY POINTS

1. The incidence of significant knee injury among females is five times higher per player hour than for males.
2. Investigation shows that a large proportion of female knee injuries are non-contact.
3. Poor eating habits and eating disorders are more common in females so review this in prevention.

Important to practice proper landing techniques

the other leg extended, toes pointing to the ceiling. Lean forward until you feel a stretch. Hold for five seconds then return to your original position. Repeat six to ten times on each leg.

6. Training and conditioning should be a year-round program. Skill drills and strength and flexibility exercises will enhance balance and coordination so you will be ready when the season starts. These can include Pliometrics (a progressive jump-training program that emphasizes form and technique of jumping and landing), Deceleration training (landing from a jump, accelerating, changing direction, and then decelerating), and Proprioceptive (balance) techniques.

Further Reading

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CLINICAL PEARLS

1. It is best to wear low heels to reduce weakening calf muscles and hamstrings.
2. Consider strength training to aerobic training at 50/50 and doing stretching after strength training
3. Practice proper landing techniques with pliometrics, deceleration training and proprioceptive techniques.