

Causes and Prevention

Knee Injuries In The Young Female Athlete

By: Kelly J. Eberhardt, MPT, CSCS



I have experienced knee injuries myself, observed them happen to teammates and opponents, and treated them in many young female athletes.

Unfortunately, it seems that females get the "short end of the stick" with this health problem. Studies have shown that female athletes are 4-6 times more likely to experience a serious knee injury in cutting or jumping sports. Cutting and jumping sports include basketball, volleyball, lacrosse, soccer, tennis, etc. Why is this and what can female athletes do about this? This article will answer these questions for you.

There are three theories that have been developed as to why female athletes are at a greater risk for knee injuries. First, the sex hormones present in a female cause ligamentous laxity. There is still controversy as to whether this joint laxity actually contributes to the increased incidence of knee injuries in female athletes.

Second is the anatomical structure of the female skeleton compared to the male skeleton. Females have a wider pelvis, which can cause the knee joint to be positioned inside of the hip and ankle joints. This causes an angle to be formed at the knee joint called "valgus" in medical terms. The degree of this angle varies in females. To give you a visual understanding, imagine a

male and female walking on stilts. The male's stilts are straight and the female's stilts are bowed outwardly or have the valgus angle in the middle of them. Who do you think is more likely to fall or get injured? So female athletes not only get the "short end of the stick" but the "bent" sticks as well.

Another anatomical problem that may contribute to the increased risk for knee injuries is a narrower femoral notch through which the major ligaments in the knee travel (the ACL or anterior cruciate ligament and the PCL or posterior cruciate ligament). This may cause more friction on these ligaments in females more so than male athletes. The final anatomical strike against female athletes is that it has been proven that females have a lower tensile strength of the ACL ligament compared to males. All of these anatomical problems contribute to the increased number of knee injuries seen in female athletes.

The hormonal and anatomical reasons for the increased incidence of knee injuries in female athletes cannot be changed or avoided. However, the lack of neuromuscular control, the third theory of why female athletes are more prone to knee injuries, can be improved with proper resistive strengthening and plyometric training. There have been two neuromuscular control limitations identified thus far in the female athlete that can cause knee injuries. First, there is a weakness and delay in the hamstring

reaction during jumping and landing. This is problematic in that the hamstrings are the first line of defense to the ACL. The hamstrings, if working properly, provide the same support to the knee as the ACL. Both prevent the tibia bone (leg bone) from shifting forward on the femur bone (thigh bone), or the femur from shifting backward on the tibia bone. If the hamstrings are not reacting fast enough or are too weak there is undue stress to the ACL.

The second neuromuscular control limitation in female athletes is excessive valgus (and occasionally varus, or bow legged at the knee joint, the opposite of valgus) posturing during jumping and landing. As you recall from before, valgus is an "L" angle at the knee joint and varus is the opposite or bowing outwardly as you would associate with a cowboy or cowgirl. This type of posturing during jumping and landing can cause more stress to the knee joint and ligaments leading to injury.

Research has demonstrated that these two neuromuscular control

limitations may be improved with a supervised plyometric and strength training program. With this type of exercise routine research has shown an improved hamstring-quadriceps strength ratio, decreased landing forces, and decreased valgus and varus torques with jumping and landing.

What is plyometric training? Plyometrics are exercises that require a muscle to reach its maximal strength in the shortest possible time. These exercises are usually different types of jumping that are used based on the sport for which the athlete is training. They should be used with proper supervision to correct and prevent abnormal posturing as described above. Plyometric training should only be utilized twice a week and complemented by a resistive training program that works on the primarily the quadriceps and hamstrings. However, general strengthening of the lower extremities is recommended, but should be sport specific.

For more information on this topic please feel free to contact Kelly J. Eberhardt, MPT, CSCS at Physical Therapy at Briarcliff Manor at 914-762-2222.