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Prevention of ACL Injuries in Female Athletes through Early Intervention

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Submitted by: Rodney C. Whittle, Ph. D., Associate Professor, HPER, Alabama A&M University and Brett Crow, Physical Education Instructor, Whitesburg Middle School, Huntsville, Alabama

Abstract

With respect to physical education, increased participation in sport equals success. One of the main goals of physical educators is to enable individuals to become proficient in lifelong activities. Hopefully, this proficiency will lead to a healthier and more fulfilling life. Beginning with Title IX and continuing over the last two decades, there has been an explosion of youth sports opportunities. As children have begun to participate in sports programs at earlier ages, parents have started feeling pressure to enroll their children in similar programs in order for them to remain competitive. As a result, children become increasingly proficient at their respective sports at earlier ages. This proficiency, while benefiting the respective sport, is not without its consequences. One of the most notable consequences of increased participation in sports at an earlier age is in the area of sports injuries (Rentrom, 2008).

Introduction

Over the last two decades, female participation in sport has risen dramatically. Moreover, the rate of females acquiring injuries to their anterior cruciate ligament (ACL) has risen at an alarmingly dramatic rate. According to recent studies by Arendt (1995), females are between two to eight times more likely to injure their ACL than their male counterpart in similar sporting events. Typically, these injuries are occurring in sports such as basketball, volleyball and soccer. Participants in these sports are usually involved in a lot of quick cutting motions, jumping motions and rapid slowing or decelerating movements. ACL injuries generally prevent a student from participation throughout the remainder of the season, and some injuries can permanently end a student's ability to

successfully participate (Rentrom, 2008).

The Cost

ACL injuries usually come at a very high cost to the participant and their family. The cost of the medical treatment alone can easily run thousands of dollars. Moreover, this type of injury can greatly reduce an athlete's self esteem and confidence. Therapy must also be considered, which places a high burden on family members with respect to the time lost and money spent. These losses combined, often make ACL injures catastrophic losses to athletes and their families.

Causes

With approximately 70% of ACL injuries coming from non-contact incidents, many studies have been conducted in order to find causes or preventative measures to counteract the problem. These studies have attempted to narrow the causes and help reduce the occurrence of ACL injuries in female athletes. Presently, research has narrowed its focus to a handful of probable causes. In female athletes, the factors include, but are not limited to: Increased valgus movements during landing, pre-menstrual hormone levels, narrower intercondylar notch width and smaller AC ligaments (Griffin, L. Y., 2000). Research has also noted different firing sequences of leg muscles in male and female athletes. These firing differences help explain some of the different responses that females exhibit to athletic movements and thereby expose themselves to higher risk during those movements. As a result, females find themselves at a biomechanical disadvantage to males when it comes to ACL strength and stability (Ireland, 2002).

Prevention

The good news is that studies have concluded that the incidence of ACL injuries can be reduced through neuromuscular training (Roniger, L. R., 2007). With this type of training, females have been shown to reduce valgus moments when landing (Foster, J. B., 2007). Moreover, as a result of the training, female athletes can incorporate more muscular control and experience less ligament dependence during movements such as cutting, landing, jumping and rapid deceleration. With appropriate training, which can and should be done in the physical education classroom, female athletes can significantly reduce their risk of a catastrophic non-contact ACL injury (Mandelbaum, 2005).

Muscular training to reduce the risk of ACL injuries is not a difficult task. Furthermore, the training falls right into the Physical Education guidelines of helping

individuals lead healthier and more satisfying lives. Certainly all of the muscles in the leg would benefit from strength training and stretching, however, this paper will focus on the larger muscles in the Hamstrings and Quadriceps. Most athletes have strong quads because of the amount of work that those muscles do during exercise. A study by Chappell, J., et.al. in 2007 concluded that females landed with less knee flexion, increased quadriceps activation and less hamstring activation. This resulted in increased ACL loading during the landing phase and therefore increased the risk of damage. With this in mind, greater hamstring strength should be a priority in most female athletes. The hamstrings, however, are often overlooked during training. There is much debate, but generally the hamstrings should optimally fall within 60 – 80% of the strength of the quads. The following hamstring strengthening exercises would work well for school Physical Education programs. The first exercise is the squat. A slight bend in the waist and a deep knee bend are necessary to lower your hands to the floor. After your hands have touched the floor and you have counted to three, then return to the starting position. Throughout the exercise, your back must be straight so that the legs and buttocks do the work. The second exercise is the leg curl. This exercise is done from the standing position, preferably facing a table or a stage. While keeping the right leg straight, bring the left foot up toward the buttocks. You should feel the strain in your hamstring as you touch your left heel to your buttocks. Repeat the exercise until the hamstring is fatigued. Repeat with the exercise with the right leg as you keep the left leg straight. The third exercise is the kickback. Stand close to and facing a wall. While keeping the right leg straight, kick the left backwards as far as possible. This will vary from one to three feet depending upon flexibility. Keep the left leg at the furthest position for a count of one. Move the left leg to the initial position. There should be very little bend at the waist and both the legs must be kept straight throughout the exercise. Repeat the procedure for the right leg while keeping the left leg straight. Toe raises will also help stabilize the knee. Simply stand with you feet about shoulder width apart and lift your heals, one at a time, as high as possible before lowering them back to the ground. Start off with sets of 10 and increase as possible.

The final area which can be easily addressed in physical education programs and will help reduce the risk of ACL injures is jump training. These jumping exercises should be conducted with proper form. Proper form includes keeping the legs together, not allowing the knees to come apart, landing softly with bent knees, and finally, forcing the individual to remain balanced at all times. Do not allow anyone to rush through the exercises. These jumps should be over a small cone and should

incorporate both legs at the same time. The first set should be done by jumping forward over the cone and then jumping backwards to the initial starting position. The second exercise would be to have the individual jump from side to side over the cone and then jump back to the original position.

These exercises, if done correctly and in conjunction with a proper stretching regimen, could help reduce the incidence of ACL injuries in female athletes. Further tracking of female students participating in a structured physical education setting would substantiate the reduction of this type injury.

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