

A Knee to The Top - Part II

Last month we delved heavily into the anatomy and surrounding tissues of the knee joint in order to understand some common injuries we face as bowlers and athletes. I then evaluated four specific knee injuries experienced within the bowling community. Defining signs/symptoms and treatment variables from the current literature was also important for the review. Finally, we looked closely at the **RICEI System** of home remedy analyzing each distinct portion of the acronym. Now to complete our in-depth study of the knee joint, educate bowlers concerning the options available if injured, and recommend specific treatment or training protocol, it is this month's portion of the review to define and differentiate between activity and exercise progressing to a knee joint specific training routine.

I have always hypothesized there is a strong relationship between the knee's functional capacity and bowling performance. Though my theory is not statistically proven, I do place strong belief in its validity. The knee joint supports an extremely large portion of the body's weight simultaneously providing the muscular ability to balance itself throughout the bowling approach. Bones, muscles, tendons, ligaments, cartilage, nerve impulses, and blood flow all work together affording bowlers the opportunity to function optimally. It is suffice to say then, among the most important and most often stressed of all body parts, the knee joint and surrounding tissues deserve the ink. **Therefore, it is my belief in order to improve your bowling performance; commit and develop a bowling-specific training program designed for the sole purpose of strengthening the knee joint to withstand the immense demands and pressures of our sport.**

By the very nature of sport the knees generally sustain large amounts of stress classifying them as one of the most injury prone joints of the body. The knee itself is a very complicated conglomeration of bony and tissue arrangements located between the femur and the tibia and fibula bones. Though weak in many anatomical ways, the knee's greatest quality is the firm support system of muscles, ligaments, tendons, cartilage, and meniscus. Previously we took an advantageous look at the inner workings and anatomy of the knee and analyzed four bowling related injuries providing and defining rehabilitative methods used by today's sport medicine practitioners. **To conclude our interests of this topic allow me to devise for you an effective training program for strengthening the knee joint and surrounding tissues.**

- Before jumping into the training routine, activity must first be differentiated from exercise to increase awareness of the differences. Activity is generally recreational in nature. It is usually sport oriented and often less invigorating than exercise. Activity does not specifically train the cardiovascular system or the musculoskeletal system simply because it does not elicit a training heart rate or overload the muscles. Exercise, on the other hand, is work and difficult at times. It elicits a training heart rate and overloads the muscles providing ample opportunity for strength adaptation. Exercise also induces the release of multiple amounts of hormones and chemicals, burns larger amounts of calories, and can often be completed in shorter periods of time. **It is important to understand activity is recreational and true exercise is adaptation and goal oriented.**

In previous **BTM** reports (October 1995 Vol. 2(10) & May 1996 Vol. 3(5)) I designed strength training and stretching exercises to be used by bowlers and athletes alike. Both were static forms of exercise providing stimulus based on static (stationary) positioning. They were again appropriate forms of exercise based on the predefined goals and objectives. Our present objective though, is to formulate a sound training program effectively exercising and strengthening the knee joint and surrounding tissues in a dynamic fashion.

The Training Protocol

Every training program no matter what the objectives have three specific requirements to make it effective. Each requirement met in collaboration with the others enables the exerciser the opportunity to experience the positive benefits or physical & mental adaptations derived from the routine. I strongly recommend you copy the three requirements onto a 3x5 note card and carry it with you whenever you workout. Memorize and conform to them.

- **Acceptance** - bowlers and athletes alike often do not fully accept the theory or reasoning behind the training principle. It is unfortunate I cannot speak to each doubting "Thomas" individually to convey my understanding and convince them of the highly positive correlations between bowling performance and physical fitness. Therefore, we transfer that information, not by word of mouth, but through our magazine. **Your first step to training the knee joint is to fully accept the promotions in strength, flexibility, and functional capacity are direct ways to improve your performance and prevent future injury.**
- **Commitment** - Over the years of managing various exercise facilities and clubs I have seen literally hundreds of thousands of people start a program with good intentions only to allow outside interferences or the lack of commitment derail their focus. **Your second step to training the knee joint is to commit your time and efforts/energies to a consistent pattern of weekly-monthly-yearly exercise.**

- **Training** - the word defines itself. You will only gain once you have trained. General activity is not the solution. Exercise, which is difficult and seemingly work-related, is the only way to develop your physique to its fullest potential. Don't you owe it to yourself? **The third step to training the knee joint is performing the exercises in the prescribed fashion using energy and intensity as your greatest assets.**

A Knee Training Protocol

There are two parts to your training protocol that includes the warm-up phase using aerobic activity and the anaerobic phase using resistance training. The following exercises and routine are given in distinct order and should not be deviated from unless otherwise advised. I recommend you use this training protocol once and at most only twice weekly allowing two or three days minimal rest between each session. The importance of rest and recuperation between days of this routine provides the body ample time to rejuvenate the fatigued energy stores and repair and build upon the muscle tissues that were exercised. Keep in mind, rest and recuperation allows the occurrence of training adaptations.

Warm-Up

It is best to begin any routine with a minor warm-up of the body or areas to be exercised. For this protocol 10-15 minutes of slow progressive activity will allow the knee joint to loosen and increase blood flow to the surrounding muscle tissue. Warm-up activity is designed to allow a bony joint to loosen by the internal lubrication of synovial fluids and increased blood flow to the muscles. It also increases joint mobility by enhancing flexibility of muscle tissue. Try walking, biking, rowing, stepping, jogging, or some minor activity that incorporates the hips and legs to become active. The warm-up activity should start slow and progressively increase in pace and intensity. Those of you who like to train aerobically, the warm-up phase of this protocol can become your aerobic session. However, I stress not to exceed 30 minutes if you are aerobically training because it will fatigue a majority of the energy stored in the legs preventing effective leg strength training.

The Resistance Training Principle

For our discussion it is wise to refer to last month's anatomy of the knee joint to understand the design of the knee and the subsequent required exercises. Since the knee is a hinge joint and only moves in two specific directions (flexion & extension) we will also train within them. To enhance the overall training protocol and its effectiveness, we will also train incorporating the hip and ankle joints that assist in both knee movements. **There are only four specific exercises you will be performing to efficiently and effectively train the knee joint and surrounding muscles. They include leg extensions, leg curls, stationary squats and toe raises.**

The training principle will be **basic strength training** using resistance exercise as the foundation for promoting the desired physical adaptations. **Basic strength training** allows an exerciser to perform one set of an exercise using a high value of resistance in slow motion fatiguing muscle tissue to a near fail state. The slow motion count is a 4 seconds contraction count and a 4 seconds relaxation count (4x4). As you raise the resistance or weight, simultaneously count 4 seconds to complete the first half of the movement. Lower the resistance in accord with same 4-second count completing the second half of the movement. This is classified as one repetition. By using **basic strength training** there is no longer a need for multiple sets and repetitions, lengthening a routine. **Upon the completion of the resistance set no further work is required of that exercise. That's all you need to do. One set of 10 repetitions using a high value of resistance and a 4x4 count.**

Initial Resistance

To ascertain the resistance required, experiment with each of the four exercises prior to the start of the routine performing the exercise with various resistance factors. Determine specifically the greatest resistance that can be handled in slow motion for only 10 repetitions. This is your starting weight until a change is required. As your training progresses you will notice the single set resistance to become easier as your body adapts. Once this occurs, increase the resistance slightly using either a 5 or 10 pound incremental jump. Stay with the new resistance factor until the next jump is required. Continue to push yourself to a point of increasing the resistance factor until leg strength is at desired levels. Remember, keep the increases minimal and the motions slow.

Exercise # 1 - Leg Extensions

Use a leg extension machine designed by any of the fitness equipment manufacturers. Position yourself in the machine having a staff person or trainer adjust your seat height to match your leg length. Set the resistance factor to your preset

intensity level. Perform 10 repetitions, extending slowly for 4 seconds (a) and relaxing slowly for 4 seconds (b). Control the resistance at all times not throwing the weight or dropping it back, but instead treating it as gently and softly as a baby. Push yourself, strain and exert your muscle forces. Remember, this is not activity, but instead exercise.

Exercise # 2 - Leg Flexion (Curls)

Use a leg flexion (curl) machine designed by any of the fitness equipment manufacturers. Position yourself in the machine having a staff person or trainer adjust the machine to match your lower leg length. Set the resistance factor to your preset intensity level. Perform 10 repetitions, flexing slowly for 4 seconds (c) and relaxing slowly for 4 seconds (d). Control the resistance at all times not throwing the weight or dropping it back, but instead treating it as gently and softly as a baby. Push yourself, strain and exert your muscle forces. Remember, this is not activity, but instead exercise.

Exercise # 3 - Leg Press (if this machine is not accessible try a variation of the leg squat, use only machine variations, no free standing exercise.)

Use a leg press or variation machine designed by any of the fitness equipment manufacturers. Position yourself in the machine having a staff person or trainer adjust the seat positioning to match your leg length. Set the resistance factor to your preset intensity level. Perform 10 repetitions, extending slowly for 4 seconds (e) and relaxing slowly for 4 seconds (f). Control the resistance at all times not throwing the weight or dropping it back, but instead treating it as gently and softly as a baby. Push yourself, strain and exert your muscle forces. Remember, this is not activity, but instead exercise.

Exercise # 4 - Seated Toe (Calf) Raises

Use a seated toe (calf) raise machine designed by any of the fitness equipment manufacturers. Position yourself in the machine having a staff person or trainer adjust your seat height to match your lower leg length. Set the resistance factor to your preset intensity level. Perform 10 repetitions, flexing slowly for 4 seconds (g) and relaxing slowly for 4 seconds (h). Control the resistance at all times not throwing the weight or dropping it back, but instead treating it as gently and softly as a baby. Push yourself, strain and exert your muscle forces. Remember, this is not activity, but instead exercise.

Knee injuries, especially in bowling, can be prevented by increasing the muscular strength of the surrounding tissues. The preceding knee strengthening protocol and information will enable you to take an active part in preventing future injuries and controlling previous one. **It is in your best interest, as dedicated bowlers, not only to learn and practice proper rehabilitative measures, but continually strengthen the surrounding muscle tissues.** If pain or injury arises during or due to the program stop immediately and seek medical attention. Always consult your medical provider before beginning this or any other exercise routine.