STRETCHING AND INJURY PREVENTION

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INTRODUCTION

Stretching is a popular prescription among health care professionals, athletic trainers and in fitness/coaching personnel, all whom have an interest in improving flexibility in both healthy and injured clientele. Stretching has been touted to enhance athletic performance, prevent musculotendinous strain injuries and reduce delayed onset muscle soreness however confusion and controversy exists over when stretching is most effective and some claims and common uses of stretching are not supported by research [4].

STRETCHING EFFECTIVENESS

Stretching has been shown to be effective in increasing joint flexibility about the knee, hip, trunk, shoulder and ankle joints including muscle length/flexibility [3, 4, 9, 10, 13, 15]. Studies have shown that regular stretching can improve eccentric and concentric force production, velocity of contractions, maximal volitional contractions, counter-movement jump height, 50 yard dash and athletic performance [8,14]. One study even found that regular stretching can induce hypertrophy in immobilized muscles and another speculated that this effect may improve performance in the long term [2, 14].

The time required to obtain the most favorable muscle lengthening/joint range of motion (ROM) results were varied. Studies found that passive stretches of 15 to 30 seconds were more effective than stretches of shorter duration and just as effective as stretches of longer durations acutely [4, 15]. Reports of other studies found that the overall time of stretching was most important and found that 6 repetitions of 10 seconds each was just as effective as 2 repetitions of 30 seconds. 3 sets of 15 second stretches were effective as well. The greatest gains in flexibility were made if stretching occurred on a regular basis over time. [4] One study reported that a static stretch of 1 repetition for 30 seconds, 3 days a week for 4 weeks significantly increased hamstring length/flexibility [3]. Consensus was that passive static stretching was more effective than proprioceptive neuromuscular facilitation techniques, active assisted or dynamic stretching protocols in improving muscle length [4, 14].

Mechanisms of muscle lengthening with stretching, is not uniformly agreed upon. Some reports state that stretching affects the visco-elastic nature of the musculotendinous unit, where others dispute this claim and have reported that stretch tolerance/compliance alone is responsible for the elongation effects [10, 16].

DETRIMENTS OF STRETCHING

It is in the use of stretching immediately before exercise or testing where the adverse effects of this technique are seen. It has been shown that acute bouts of stretching does not improve maximal volitional force output, jump height, running speed, static balance, reaction time, or movement time [1, 13, 14, 15]. In this format, stretching results in a decrease in isokinetic performance, velocity of contraction, muscle force produced with contractions, musculotendinous unit compliance and a reduced ability to store elastic energy in the eccentric phase [5, 14]. These negative effects have been reported to last up to 1 hour following stretching [15]. A reduction in running economy has been reported as a result of stretching [15], however Nelson et al [11] dispelled that assumption in their study by showing that VO_{2peak} was not affected by a chronic stretching program.

Several studies and reviews have looked into the use of pre-event stretching to reduce the risk of injury [6, 7, 12, 15, 16]. Most have shown or reported that pre-event stretching does not reduce the risk of injury. Witvrouw et al [16] suggested in their review that pre-event stretching was useful in preventing injuries in sports with high stretch shortening cycle movements (ie football or soccer), however stretching was always incorporated with an active warm up, which may have contributed to the reduction of injury. As well, studies of athletes that suffered muscle lesions were found to have less muscular flexibility than those without injury. One should not make the assumption that pre-event stretching would have benefited these athletes more or less than a regular/chronic stretching program.

While not a detriment per se, it should be reported as a fallacy, that stretching before or after exercise does not confer protection from muscle soreness [7]. Additionally, it has been suggested that in sports that do not require burst or flexibility (ie jogging or cycling) that a certain amount of stiffness in the musculo-tendinous structures would in fact be beneficial [16].

STRETCHING PROGRAMS

While acute pre-event stretching does not seem to be beneficial, there is enough research to support stretching in a long term training program in order to enhance muscle length, flexibility and athletic performance.

The Racing Greyhound

The racing greyhound competes in a sprint around an oval or circular track. It would require flexibility in the multiple-joint muscles that act in propulsion of both the fore and hind legs such as gracilis, hamstrings (biceps femoris, semitendinosus, and semimembranosus), gastrocs and the calcaneal tendon, as well as the long head of triceps, and latissimus dorsi.

The goal for implementing a stretching program for the racing greyhound would be just to ensure adequate muscle length in order to achieve the exaggerated ROMs and eccentric muscle contractions in those ranges. I would recommend for these animals a stretching program of the muscles/muscle groups (bilaterally) mentioned above, consisting of one 30 second stretch every second day excluding race days and on training days only after training sessions.

The Sled Dog

The sled dog may be required to traverse (at a trot) over land or snow for several hours. Flexibility is not a requirement or an asset for this athlete and there is little need in this sport to utilize the energy-absorbing capacity of the muscle-tendon unit. No studies found reported any performance enhancement on endurance with the use of stretching. For these reasons, I would advise not to bother stretching these animals as part of a regular or pre- or post-event activity.

The Agility Dog

The agility dog must utilize its body in burst modes, both jumping and changing directions. It would benefit from elasticity and elastic recoil in its muscles and tendons as well as muscle power and jump height. A regular stretching program would assist in achieving these goals with this athlete. I would advise a stretching regime that targeted the biceps brachii, long head of triceps, deep and superficial digital flexors of both the front and back limbs, as well as the gluteals, hamstrings, and quadriceps. One 30 second stretch every second day to all the muscles/muscle groups mentioned should be utilized for these athletes. Not to be utilized on competition days and on training days only after the training practice.

CONCLUSION

It is easy to fall into the practice of utilizing certain training or treatment techniques based on common usage. However, implementation of research findings can point the direction to better success or enhanced performance. Stretching is indeed an enigma that has been credited with much more that it's true worth. While not devoid of value, stretching practice should be based on research findings.

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