



PREVENTION OF HAMSTRING MUSCLE STRAIN IN SPORTS

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Abstract:

Introduction:

The muscles of back of thigh are called the Hamstring muscles. They are the semitendinosus, the semimembranosus, the long head of biceps femoris and the ischial head of adductor magnus. The hamstring muscle share the following characters:

- 1) Origin from ischial tuberosity
- 2) Insertion into one of the bones of legs.
- 3) Nerve supply from tibial part of sciatic nerve
- 4) The muscles act as flexors of knee and extensors of hip.(1)



Hamstring strains are among the most common injuries in sports that involve sprinting and jumping. It has been shown that hamstring strain injuries account for 12–16% of all injuries in English and Australian professional football. A rate of five to six hamstring strain injuries per club per season has been observed, resulting in 90 days and 15–21 matches missed per club per season on average. This results in, on average, 18 days and 3–3.5 matches missed per hamstring strain. The re-injury rate for hamstring injuries has been found to be 12–31% (2)the occurrence of hamstring strain injuries during high-speed running is generally believed to occur during terminal swing phase of the gait cycle. During the

second half of swing, the hamstrings are active, lengthening and absorbing energy from the decelerating limb in preparation for foot contact. The greatest musculotendon stretch is incurred by the biceps femoris, which may contribute to its tendency to be more often injured than the other 2 hamstring muscle.

Hamstring injuries that occur during activities such as dancing or kicking can occur during either slow or fast movements that involve simultaneous hip flexion and knee extension. Such movements place the hamstrings in a position of extreme stretch, with injuries most commonly presenting in the semimembranosus and its proximal free tendon (as opposed to the intramuscular tendon). These injuries tend to require a prolonged recovery period before an individual is able to return to the preinjury level of performance. Given the high incidence of hamstring strain injuries across a variety of sports and activities, and the substantial tendency for injuries to recur, the greatest impact may be achieved by developing improved techniques for preventing initial injury (3)

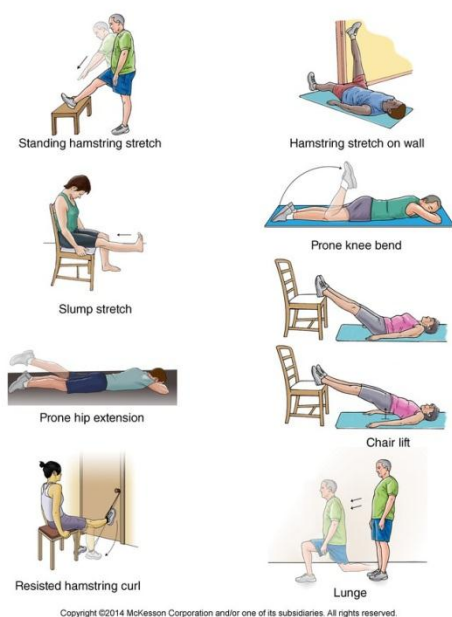
The main elements involved in the prevention of hamstring strain in sports injuries include stretching, strengthening and warm up exercises, which are described below-

Stretching:

The study by Hartig et al prospectively followed two groups of military infantry basic trainees both carrying out a scheduled fitness programme over 13 weeks. One group followed the regular fitness programme, and the other group added three hamstring stretching sessions (before lunch, dinner, and bedtime) on each day of

the 13 weeks. The study showed that flexibility increased significantly in the intervention group compared with the control group. The number of injuries was also significantly lower in the intervention group.(2) stretching have a role in hamstring muscle strain injury prevention by improving force absorption for a given length of muscle, thereby making the muscle more resistant to stretch injury. This is extrapolated from the well understood principle that the viscoelasticity properties of muscle can be changed by stretching, with studies demonstrating that stretching results in a reduction in load on the muscle-tendon unit for any given length.(4)

Hamstring Strain Rehabilitation Exercises



Strengthening:

The study by Askling et Al examined the effect of preseason strength training with eccentric overload in Swedish elite soccer players. Thirty players were randomly divided into two groups: a training group and a control group. The only difference between the groups was that the training group received additional specific hamstring training during a 10 week preseason period. The training group performed a total of 16 sessions of specific hamstring strength training, every fifth day for the first four weeks and every fourth day during the last six weeks. The specific hamstring training

consisted of both concentric and eccentric actions and was performed on an ergometer. The study showed a significant increase in both concentric and eccentric strength in the training group compared with the control group. Furthermore, maximum running speed was increased in the training group compared with the control group. The most important result of the study was that the number of hamstring injuries decreased significantly in the training group. (2)Also, the incorporation of eccentric hamstring exercises as part of routine training has been found to substantially reduce the incidence of hamstring strain injuries. The addition of eccentric hamstring strength exercises as part of preseason and in-season training for elite soccer players reduced the incidence of hamstring strain injuries (risk ratio, 0.43; 95% confidence interval: 0.19-0.98).³ While this may simply be attributed to the increase in peak hamstring eccentric strength, it has also been suggested that the injury risk reduction benefit from eccentric training may be due, in part, to the resultant shift in peak force development to longer muscle lengths.⁽³⁾

Warm up:

The benefits of warming up in reducing the incidence of injury have been studied by Safran et al. The study showed that: (a) the preconditioned muscles required more force to fail than the contralateral controls; (b) preconditioned muscle can be stretched to a greater length from rest before failing than the non-preconditioned controls; (c) the site of failure was not altered by condition—in all muscles the site of failure was the musculotendinous junction; (d) the preconditioned muscle attained less force at each given increase in length before failure. This study therefore indicates that isometric warm up before exercise has the potential to prevent muscle strain injury. (2)

Key Features Of Hamstring Injury Prevention Programme-

A study suggested the key features of any hamstring injury prevention program in sports such as Australian football with its requirement for much high intensity anaerobic interval running to be as follows:

(1) to improve the training regime so that it more accurately reflects match playing conditions with the goal of improving muscle conditioning; (2) to try and improve fatigue resistance of the hamstring muscle; and (3) to try and induce a change in the viscoelastic properties of muscle so as to increase energy absorption and decrease load on the muscle-tendon unit for any given length especially in body positions of function and vulnerability to injury.(4) owing to which will lead to a substantial decrease in incidence of hamstring muscle strain in various sports.

References:

- 1) Human anatomy, volume 2, fifth edition, pg-91
- 2) Evidence based prevention of hamstring injuries in sport **J Petersen, P Ho"lmichBr,** Journal of Sports Medicine 2005;39:319–323
- 3) Hamstring Strain Injuries: Recommendations for Diagnosis, Rehabilitation, and Injury Prevention by **Bryan c. Heiderscheit, PT, PhD, Marc a. Sherry, PT, DPT, LAT, CSCS, aMy Silder, PhD, elizabeth S. Chumanov, PhD, Darryl G. Thelen, PhD** Journal of orthopaedic & sports physical therapy, volume 40, number 2, february 2010.
- 4) The effect of sports specific training on reducing the incidence of hamstring injuries in professional Australian Rules football players by **G M Verrall, J P Slavotinek, P G Barne** Br Journal of Sports Medicine 2005;39:363–368
