The Nordic Eccentric Hamstring Exercise for Injury Prevention in Soccer Players

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SUMMARY

ECCENTRIC HAMSTRING MUSCLE ACTIONS ARE INVOLVED IN SEVERAL MOVEMENTS IN THE GAME OF SOCCER. RECENT STUDIES HAVE INDICATED THAT THE NORDIC HAMSTRING EXERCISE IS AN EFFECTIVE WAY OF ECCENTRICALLY STRENGTHENING THE HAMSTRINGS IN SOCCER PLAYERS, RESULTING IN REDUCED INJURY RISK AND IMPROVED PERFORMANCE.

INTRODUCTION

Hamstring injuries are common in sports that require repeated acceleration, deceleration, and maximal sprinting. Recent studies in elite level soccer have shown that hamstring injuries account for up to 17% of all injuries (1,3,6). Several factors have been identified as potential causes for the incidence of hamstring injury in soccer players, including poor hamstring strength, strength imbalance between hamstrings and quadriceps, and previous hamstring injury (3,5,7).

REVIEW OF THE RESEARCH

Recent studies have demonstrated that preventative measures can be implemented in addressing susceptibility to hamstring injury in soccer players (2,4,7). A 10-week preseason hamstring strength training program emphasizing eccentric overload has been shown to significantly reduce hamstring injury rate in professional male soccer players during the following 10-month season (4). Additionally, the same strength program resulted in increases in maximal running speed and isokinetic hamstring muscle strength. Although it is common to strengthen the hamstrings concentrically, it is evident that eccentric strengthening is equally important to both injury prevention and optimal performance.

Mjolsnes and colleagues (7) found that the Nordic hamstring exercise was more effective in developing maximal eccentric hamstring strength than the traditional hamstring curl (7). Eccentric strength training with the use of the Nordic hamstring exercise was also found to reduce the risk of hamstring strains in elite male soccer players (2). The effect of eccentric strength training when using the Nordic exercise in addition to a warm-up protocol was compared with the effect of a flexibility training program with the same warm-up protocol on hamstring strain incidence during a 2-year period in players from elite Norwegian and Icelandic soccer teams. Baseline data were collected during the previous 3 years. The flexibility training program consisted of a contract–relax method of proprioceptive neuromuscular facilitation being performed after practice 3 times per week during the preseason and 1 to 2 times per week during the competitive season. The teams consisting of participants who used the Nordic hamstring exercise had a significantly fewer number of hamstring strains than did the teams consisting of participants who used the flexibility program. Additionally, the teams consisting of participants who used the Nordic exercises suffered fewer hamstring strains than they had during the previous 3 years. However, teams consisting of participants who used the flexibility training program showed...
no improvement in the amount of hamstring strains when compared with the previous 3 years (2).

TECHNIQUE
According to the research previously discussed, eccentric strength training of the hamstrings when one uses the Nordic exercise can both lower the risk of hamstring strain and improve performance. The Nordic hamstring exercise requires the assistance of a partner. The starting position requires the athlete to begin on his/her knees, with knee flexion at 90°, the hips slightly flexed, and an erect torso. The partner secures the athlete's ankles to the floor throughout the exercise (Figure 1). The athlete then falls forward from the knees, resisting the fall for as long as possible with the hamstrings (Figure 2). As the athlete’s upper body approaches the ground, the hands must quickly be turned out to buffer the fall, letting the chest touch the ground (Figure 3). The athlete should keep the hips in a slightly flexed position throughout the range of motion. Upon completion of one repetition, the athlete must immediately return to the starting position by thrusting themselves back up using their hands to minimize loading in the concentric phase (2,4,7).

IMPLEMENTATION
Given that no equipment or specific environment is required to perform the Nordic hamstring exercise, it can be easily incorporated into any training routine. It is also time efficient as several athletes can perform the exercise simultaneously. As stated earlier, a 10-week, preseason Nordic hamstring exercise program can have significant positive results on both injury prevention and performance (4). Therefore, when initially incorporating Nordic eccentric hamstring exercises, the program should begin 10 weeks before the start of the season. Table 1 displays recommended frequency, volume, and time frame for implementation of the program (7). Load is increased by attempting to withstand the fall for longer. When the entire range of motion can be withstood for 12 repetitions, load can be increased by increasing speed at the starting phase of the motion, and can then be further increased by the partner pushing at the back of the shoulders (7). When the competitive season begins, frequency should be reduced to one to two times per week (2). The exercises should be completed in a non-fatigued state, and after an appropriate warm-up.

PRECAUTIONS/LIMITATIONS
As previously explained, the Nordic hamstring exercise requires the assistance of a partner. Additionally, the exercise should be performed on a relatively soft surface. Grass or artificial turf is suitable, as is a carpeted area of a strength and conditioning facility. Concrete or wooden surfaces should be avoided, unless the athletes have access to some form of mat or pad.

The role of the Nordic hamstring exercise in injury rehabilitation has yet to be extensively researched. Therefore, caution must be exerted when implementing the exercise with athletes who have a history of hamstring or knee injuries. In this case, it
is advisable to seek the advice of medical professionals before implementation.

**SUMMARY**
The Nordic hamstring exercise is a beneficial, efficient way to eccentrically strengthen the hamstring muscles for soccer. Research has suggested that, when compared with traditional hamstring strengthening exercises, eccentric strengthening results in fewer hamstring injuries and greater performance benefits. The role of eccentric hamstring muscle action in many soccer-specific movements emphasizes the importance of implementing eccentric strengthening exercises when training soccer players.

**REFERENCES**

**TABLE 1**
Recommended frequency and volume during the 10-week preseason period and into the competitive season (week 11 and beyond) (2,7)

<table>
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<td>1</td>
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Adapted from Mjolsnes et al. (7).