

**A critical appraisal of “Preventive Effect of Eccentric Training on
Acute Hamstring Injuries in Men’s Soccer”**

By

Aaron Canham, SPT

**In partial fulfillment of the
requirements for the course:**

PT 7240 Evidence-Based Practice in Physical Therapy

Department of Physical Therapy

Angelo State University

Member, Texas Tech University System

November 6, 2022

Abstract:

The purpose of this article is an appraisal of a 2011 study published in the American Orthopaedic Society for Sports Medicine examining the effectiveness of eccentric strengthening and its effect on hamstring injury in professional and semi-professional soccer in Denmark. A description of how a clinical question influenced the selection of this article will be described in the introduction. The methods section will then follow the process of selecting this article to support the clinical question. A discussion section will provide the significance towards clinical application and whether the literature is clinically relevant. Lastly, a discussion of eccentric strengthening on the hamstrings will provide information on how it can be applied in future applications.

Key words: Nordic Hamstring Exercise (NHE), Eccentric Strengthening, Football (Soccer), Acute Hamstring Injury

Introduction

Hamstring injuries are frequent in many sports, especially soccer. This is because of the peak hamstring stretch and force during the late swing phase while the hamstrings are generating tension while lengthening. As someone who grew up playing soccer, hamstring injuries were common which partially has to do with the lack of strengthening and focus on prevention of injury. I believe it is important to find a reliable intervention to prevent this injury from occurring in not only soccer, but all sports. Preventing hamstring injury at a younger age could reduce recurrent injuries in the future which is why it is important to teach athletes this concept at a young age. While formulating my clinical question, I chose to compare eccentric to plyometric training which resulted in my clinical question becoming “In soccer players, will plyometrics prevent future hamstring injuries better compared to Nordic Hamstring Exercise?”.

Methods

PubMed was the preferred database because it contains reliable research that has been published in reputable journals. The database allows you to refine your search making it easier to find literature that is specific to your limits and inclusions/exclusions. Also, PubMed publishes medical and health-based research which was the type of literature I was interested in. I included keywords during my search which were soccer, hamstring, Nordic Hamstring Exercise, and plyometrics. A parameter I included was that the publication’s presented are within the last 20 years, this was to ensure the research is up to date. I excluded any research done on youth athletes because I wanted each study to have athletes of the same age so that the data would not be comparing different age groups. I also included amateur soccer players since they are also performing at a high level and intensity just like professional and semi-professional

players. After my initial search I expected to find around 750 articles, however, only 100 studies were found.

During the selection of the three articles, the article “Preventive Effect of Eccentric Training on Acute Hamstring Injuries in Men’s Soccer” stood out to me because of the number of participants in the study. The research was led by Dr. Jesper Petersen along with fellow doctors and physical therapist who were affiliated with the University of Copenhagen in Copenhagen, Denmark. The literature was published in the American Orthopaedic Society for Sports Medicine in 2011. This Cluster-RCT study was conducted with fifty-two professional, semi-professional, and amateur soccer teams in Denmark. I chose this piece of literature because of the large sample size they were able to obtain and that it was the first study at that time to have such a large sample size.

Results

Summary of the study

Hamstring injuries occur during peak hamstring stretch late in the swing phase during a running gait cycle. This is because of the eccentric contraction to slow knee extension. The study selected looks to compare if Nordic Hamstring Exercises could reduce hamstring injuries in soccer players compared to a control group. There were 116 teams contacted from the Danish soccer divisions but only 54 (942 players) accepted but 4 withdrew. They were split into a control group and an intervention group where they had ten weeks of progressive eccentric training. The study was a cluster-randomized controlled trial study because each team had many players as subjects. An independent research assistant randomized the procedure and teams were not informed until the first training session. It was an open trial. Standardized instruction was given for definition of injury by the team’s medical staff and physiotherapists. Teams reported

hamstring injuries and players were offered free ultrasound exams but was not used to verify injury. 23 teams were given the intervention and the other 27 were control. There were 52 injuries in the control while there was 17 in the intervention group. No injuries occurred while doing Nordic hamstring exercises. Hamstring injury was lower in the intervention group (12 vs. 32) and it also had fewer recurrent injuries (3 vs. 20). The research concluded that eccentric hamstring exercise, specifically Nordic Hamstring exercise, can decrease the amount of new, recurrent, and overall hamstring injuries in soccer players.

Appraisal of the study introduction

The introduction is very comprehensive, it explains that hamstring injuries are the most common injuries in soccer, and it also has a high rate of reinjury. It then continues and cites previous studies conducted and explains that they may not have been reliable because of the small sample size. All the literature came from credible journals and are all cited correctly so it is easy to search for the sources. Each variable has been addressed adequately. The dependent variable is the number of hamstring injuries, and the independent variable are the control (No eccentric preventative exercises) and subjects doing NHE as preventative exercise.

After extensive review of the introduction, it was hard to determine any weaknesses of the introduction. The author's covered the reason why hamstring injuries occur, why they conducted a cluster-RCT study, and contradictory results that have been found by other studies. If I had to provide a critique, the authors should include whether hamstring injuries occurs more often on or off the ball and during acceleration or deceleration of a sprint

Appraisal of the study methods

The methods section provides specific information on the design of the study and which subjects were included and a reason for why others were not included. The intervention is described clearly so that someone could replicate the study which is important to include in the methods section. The statistical methods were also explained as a cluster-specific statistical methods because clubs, and not players, were randomized. Data was entered into a Microsoft Excel 2007 (Microsoft, Redmond, Washington) spreadsheet and were analyzed with the SAS software version 9.1 (SAS Institute Inc, Cary, North Carolina). I believe the correct analysis was used and is another positive in the methods section

There are a couple of corrections that I would try to implement, however, they would be hard to make. The study wasn't blind because all the subjects knew if what variable they were doing, and the team's medical staff were the ones to submit any injuries. It would be difficult to find an exercise to use in the control group as a placebo and the medical staff of the teams would also recognize if they were placebo exercise. With a large sample size means that the authors had to find teams from different parts of Denmark. This will cause eliminate a controlled environment because each team will be practicing on different fields, weather, and altitudes.

Appraisal of the study results

The results section of this paper is well organized and helps with answering part of my research question. The authors did well with explaining why teams dropped out of the study and created an in-depth table to explain the results that they had found. There were statistically significant results that are clinically meaningful because the results show that NHE can reduce

hamstring injuries in soccer players. Also, the results section reported all the outcomes that was addressed in the methods section.

One critique that I would implement is the table being a little bit more organized which would include adding lines between each column and row for easier reading. Other than that, the results section is written very well and provides good insight on how the study was conducted and I wouldn't implement any other changes.

Appraisal of the study discussion

The authors wrote the discussion very well and included multiple paragraphs of the strengths and weaknesses of the study they conducted. A limitation they mentioned was how the study was not blinded and how that could affect results. I don't believe that they over concluded their findings which is important as well because the author's saw both strengths and limitations of the study. The conclusion is also reflective of the results and involves clinical/future implications which can help reduce risk of other soccer players and could translate into other sports.

Since the study was conducted on within a special population, I believe that the have included plans for future studies testing the intervention with other sports besides soccer. By doing this, the authors would be furthering their evidence that NHE do prevent injuries and become a preventative measure for hamstring injuries for athletes in other sports. Otherwise, the discussion section had no other weaknesses.

Discussion

I believe this has great clinical significance during the end stages of recovery for a patient

who has had a hamstring injury. If an athlete is prone to recurring hamstring injuries, then participating in eccentric hamstring exercise could reduce their chances of reinjury. Even though this study was performed on soccer players, the exercise could be effective for other field sports like football, rugby, field hockey, etc. After recovery, patients can continue eccentric exercises to prevent injury after rehab. This study also supplies evidence that Nordic hamstring curls could prevent hamstring injury better than plyometric exercises but that would need to be compared to other studies that have tested plyometrics prevent injury. I have another study that I can compare to this one to assess which one is more effective.

As discussed in the previous paragraph, there are many potential benefits to this intervention in the clinic and because of this, I am in favor of this intervention being used in the clinic. Since the study resulted in enough evidence for using eccentric exercises to prevent hamstring injury. I believe if more research was done for players in other sports, it would improve the argument for the use of NHE to prevent hamstring injuries. Trainers and physical therapists would need to ensure that their players or patients are strong enough to perform this exercise without injuring themselves. Even with this risk, I believe the potential benefits outweigh the potential risks.

As a future practicing physical therapist, I have confidence in this research that I would implement Nordic hamstring exercise with patients who are appropriate to perform them. The literature was well written and conducted in a concise fashion. There were few improvements that could have been made to produce a better study but a few of them were also hard to implement. The statistical significance of the research also gives me confidence that NHE would

be beneficial to patients who have hamstring injuries. This intervention is relatively easy and safe to conduct so I believe that I would anticipate implementing NHE in my clinical setting if I'm in a sports orthopedic setting.

In conclusion, this literature focused on Nordic hamstring exercises and prevention of hamstring injuries. The study was concise and had statistically significant results that would be in favor that the intervention would prevent hamstring injuries. The authors were aware of the limitations of their methods which further builds confidence in the results. Further research could be done to confirm effectiveness in other sports, but Nordic hamstring exercises are a safe and effective way to prevent hamstring injuries.