

# The effectiveness of dry needling on hamstring flexibility: A systematic review

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## ABSTRACT

**Background:** Hamstring injuries are a common problem for athletes, and hamstring tightness has been found to be a contributing factor to these injuries. Dry needling is a growing trend that poses the possibility of increasing flexibility through several mechanisms; however, there is currently no review on all of the studies done concerning the effectiveness of dry needling for improving hamstring flexibility.

**Purpose:** The purpose of this systematic review was to evaluate the effectiveness of dry needling on hamstring flexibility in people with hamstring tightness.

**Methods:** Search terms included dry needling or intramuscular stimulation, flexibility or range of motion or ROM, and hamstring. The databases searched were PubMed, MEDLINE, SPORTDiscus, and Cumulative Index to Nursing and Allied Health Literature (CINAHL.)

**Results:** Ten articles were found from the initial search, and three remained after the removal of duplicates and screening the articles for abstracts and full text. Patients consisted of relatively young individuals with hamstring tightness. All studies used a stretching group for the comparison while interventions consisted of dry needling alone or dry needling with a stretching program. No studies showed a significant difference between dry needling and the control; however, all studies found that flexibility increased from baseline measurements following a dry needling treatment.

**Discussion:** The results indicate that while dry needling may not be a better option than stretching, it could be used as a means for improving hamstring flexibility. Possible factors for the effectiveness of dry needling include increased blood flow and oxygen saturation to the muscle as well as the release of myofascial trigger points.

**Conclusion:** Dry needling was not found to be significantly better than stretching, but poses a possibility as another method for improving hamstring flexibility.

**KEY WORDS:** Hamstrings, Athletes, Flexibility, Tightness, Dry needling, Stretching.

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## INTRODUCTION

Injuries pose a major problem for athletes, and hamstring injuries are especially common. While there are many possible causes for hamstring injuries, a lack of flexibility has been found to be a major factor [1,2]. A variety of modalities have been researched to find the

best method for improving flexibility. Some types include active techniques of neuromobilization and proprioceptive neuromuscular facilitation as well as passive techniques with the assistance of a band or a wall [3].

Dry needling has been found to increase flexibility in several other muscle groups.<sup>4,5</sup> This modality has potential for increasing flexibility due to several mechanisms. When tested in the human Achilles tendon, acupuncture resulted in increased blood flow and oxygen saturation to the area with these high levels lasting around 30 minutes after treatment.<sup>6</sup> Dry needling poses the possibility of providing similar effects, with increased blood flow providing the potential of greater heat transfer and consequently increased flexibility. Additionally, dry needling is used to elicit a local twitch response, which has been found to increase flexibility in the affected muscle by releasing trigger points [4].

To date, there have been many reviews focused on the use of dry needling for pain, but there are no reviews completed solely on the ability of dry needling to increase hamstring flexibility. Therefore, the purpose of this review was to analyze the effectiveness of dry needling as a means to increase hamstring flexibility in people with hamstring tightness.

## METHODS

**Search strategy:** This study was conducted according to the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) Group 2009 statement [5-7]. The research question utilized was in patients with hamstring tightness, what is the effect of dry needling compared to stretching on hamstring flexibility? A comprehensive search of the literature was conducted on PubMed, MEDLINE, SPORTDiscus, and Cumulative Index to Nursing and Allied Health Literature (CINAHL) Complete databases. In addition, cross-referencing of articles was done in order to ensure the thoroughness of the search process. The search strategy utilized included the following search terms: “dry needling” or “intramuscular stimulation” and “flexibility” or “range of motion” or “ROM” and “hamstring.” The final search was conducted on October 21, 2020.

**Inclusion and exclusion criteria:** Studies about dry needling that were published in English in a scientific peer-reviewed journal were included. Studies were required to include dry

needling as the intervention with measurements of flexibility for the outcome, specifically for the hamstring muscle. Subjects also needed to have hamstring tightness before the experiment. In addition, only randomized controlled trials were eligible for inclusion. Any research that was not a randomized control trial or in which data was not able to be extracted regarding the required inclusion criteria was excluded with reasons noted.

### Study selection and data extraction:

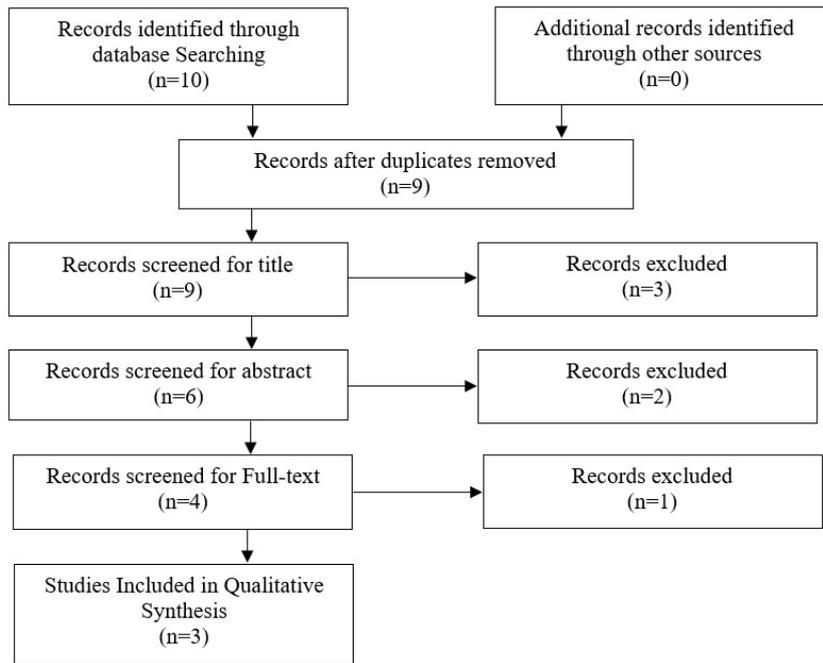
Studies were initially screened by the lead author by title with studies that were obviously not relevant and duplicates removed. Following initial screening, the lead author conducted a review of article abstracts for inclusion or exclusion criteria. If it was not possible to ascertain the inclusion or exclusion of an article based on the abstract alone, full-text analysis was conducted.

All included articles were then scored by the lead author on the Physiotherapy Evidence Database (PEDro) scale for inclusion in the analysis. Data was further extracted by the lead author to include subject characteristics, a description of the study intervention and comparison group as well as the measures used in the study. Finally, data was recorded regarding flexibility of the hamstring.

### Bias analysis:

Each included article was screened by the lead author for potential biases including the presence of external funding that might be considered a conflict of interest. In addition, sequence generation, allocation concealment, blinding, incomplete outcome assessment, selective reporting bias, and any other potential sources of bias were identified. Potential biases were included in the final analysis of the data. In addition, it should be noted that there may be a risk of bias across the entirety of the published literature that is included in any systematic review. As there is usually a publication bias with negative or insignificant results not being published, the resulting bias was minimized by giving more weight in favor of the negative results when being compared to the positive results during results discussion.

## RESULTS



**Fig. 1:** Flow chart for final review selection process.

A summary of study characteristics for all articles is found in Table 1. The number of subjects in each study ranged from 27 to 40. All subjects had hamstring tightness [9-11] with one study focusing specifically on individuals who also had knee pain not due to an injury [9]. Most subjects were young individuals with the mean age being under 25.1 for all studies. Interventions included dry needling alone [11] and dry needling in addition to a stretching program [9,10]. The controls consisted of a stretching program [11] and a placebo along with a stretching program [9,10]. Treatments ranged from one to multiple treatments with follow up ranging from immediate [9,11] to 6 weeks post treatment [10]. None of the studies found a significant difference between the dry needling intervention and control group; however, all three of the studies found a significant difference in flexibility measures between baseline and after treatment for dry needling. All articles had high PEDro scores, with two having a score of nine [10,11] and one having a score of 10 [9].

## DISCUSSION

**Summary of Evidence:** This systematic review investigated the effectiveness of dry needling for improving hamstring flexibility. Dry needling was not found to create a significant increase in hamstring flexibility compared to

the control for any of the articles. However, each study demonstrated significant improvements in hamstring flexibility from baseline measurements following dry needling interventions. While not shown to be better than other methods, dry needling may offer another approach for improving hamstring flexibility before performance. The introduction of the needle into the muscle has been found to increase both blood flow and oxygen saturation in the muscle group with effects lasting from 15 minutes [12] to 30 minutes [6] after needle removal. Both of these factors likely help increase flexibility.

Another possibility for the effectiveness of dry needling for muscle flexibility is the release of myofascial trigger points, which are tight bands of muscle tissue which can cause pain.<sup>13</sup> Needling these trigger points can elicit a local twitch response which is thought to reset and lengthen the shortened muscle; however, the effectiveness of stimulating a local twitch response has yielded inconsistent findings [13].

**Limitations:** There are several limitations to this study. First, only three articles were found that specifically focused on the hamstring muscle group, which is a small amount to use to make an accurate conclusion. Additionally, each of the studies varied greatly in protocol. The protocols either had one dry needling treatment [11] or two treatments [9,10] with

some studies incorporating a stretching routine along with the dry needling intervention [9,10]. All studies included measurements at baseline and immediately following treatment; however, the studies varied in additional measurement times from fifteen minutes after the initial intervention [11] to six weeks [10]. Dry needling technique also varied, with some studies choosing three consistent locations [10,11] and another choosing needling locations based on the identification of trigger points [9]. There are also a variety of ways the needle can be inserted, and these differences in needling technique have been a major limitation in creating a solid conclusion about the effectiveness of dry needling [13]. All of the variation makes it difficult to draw conclusions on the best method for future research and applications.

Finally, there was no true control group in any of the studies. The comparison groups included

either a stretching program [11] or a stretching program with a placebo [9]. Without a true control, the only conclusion that can be made is whether or not dry needling is a better intervention for flexibility than a stretching program. A true control would be needed to determine if dry needling provides an effective way to improve hamstring flexibility.

## CONCLUSIONS AND IMPLICATIONS

Overall, dry needling does not offer a better solution for hamstring flexibility than other methods, but it does have similar effectiveness as other proven methods such as various types of stretching. Future research should continue to find the best technique and time frame for the use of dry needling. Furthermore, research should compare dry needling to a control group with no intervention to determine if dry needling is an effective intervention for improving hamstring flexibility.

**Table 1.** Reviewed studies on the effectiveness of dry needling for hamstring flexibility.

Study	Level of Evidence; PEDro	Subjects	Characteristics	Age (yr)	Intervention(s)	Comparison	Outcome & Time frame	Results
Mason et al [9]	1b; 10	n=39	Young individuals with atraumatic knee pain and hamstring tightness	20.3±1.08 (dry needle) 20.16±2.12 (sham)	Dry needling with a stretching program	Sham dry needling (placebo) with a stretching program	Hamstring flexibility on day 1, 3, and 7 following initial treatment; a total of two treatments over 1 week	No significant difference in hamstring flexibility between stretching with dry needling vs with a sham
Geist et al.[10]	1b; 9	n=27	People with hamstring tightness	25.1±5.5 (blunt needle) 23.8±5.9 (dry needle)	Dry needling with a stretching program	Placebo with a stretching program	Hamstring flexibility 3-5 days after first treatment and 4-6 weeks after second treatment	No significant difference in hamstring flexibility between stretching plus the placebo and stretching plus dry needling
Alaei et al. [11]	1b; 9	n=40	Young individuals with hamstring tightness	23.55±3.95 (dry needle) 24.05±3.21 (static stretching)	Dry needling	Static stretching	Hamstring flexibility immediately following intervention and 15 minutes after	Flexibility significantly improved for both groups, but there was no significant difference between groups

**Conflicts of interest: None**

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