



## Research Article

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# Effectiveness of Dry needling and Stretching vs. Stretching Alone on Flexibility of Muscles

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## Abstract

**Background and Purpose:** In order to improve muscle flexibility, the study was aimed at determining whether dry needling combined with standard stretching protocol would be effective. **Significance:** This study will determine which of the treatment protocol is more effective and to determine possible benefits for patient as well as for the practitioner. **Methods:** Twelve subjects with a mean age of 24.41 after confirming inclusion and exclusion criteria, patients with bilateral hamstrings tightness were enrolled in the study. Each subject was assigned in both C1 and C2 i.e. one leg was assigned to D.N with addition of static stretching (C1) and another leg was assigned to static stretching only (C2). Active knee extension was the outcome measure to check the improvements in flexibility of the muscle. The treatment protocol was for 4 weeks and pre - post test measurements were recorded. **Results:** The result indicates that D.N with addition of static stretching leads to greater improvements in flexibility than static stretching alone. The mean improved in active knee extension (AKE) for C1 and C2 was 9.50 and 2.25 respectively. With a t-value of 3.809\*\* and 1.125<sup>NS</sup> respectively. **Conclusion:** It was concluded that D.N with addition of Static stretching was significant in improving flexibility of the muscle than Static stretching alone static stretching also shows positive improvements but was not statistically satisfied. Static stretching increases the stretch tolerance and with addition of D.N the latent trigger points are released which are the causes of tightness and which static stretching cannot release alone.

**Keywords:** Dry Needling, Static stretching, Flexibility, Active knee extension.

## INTRODUCTION

Flexibility has long been regarded as a part of human fitness, second only to strength and third only to speed, according to ACSM, 1998. Flexibility testing first came into focus in the early 1900s when there was an urgent need to evaluate disability, particularly ROM loss, in response to the pandemic and the injuries suffered during World War I. In a paper titled "Flexibility as a part of fitness", Alquier (1999), Albee (2001) and Gilliland (2003) highlighted flexibility testing, and Corbin (2006) referred to it as "The neglected part of fitness." While anthropometric research has shown differences in flexibility across athletes from different sports, the results are often retrospective and the measurement protocols vary greatly, making it difficult to understand these differences and, therefore, the role of flexibility in sports performance. The initial rationale for including flexibility as a part of physical fitness was based on reason and the idea that adequate levels of flexibility were necessary for safe and efficient movement. It is logical to assume that below an acceptable level of flexibility, an overstrained muscle would be more likely to result in injury. However, the assumption that a higher level of flexibility will reduce injury risk is not supported by empirical. There is also a widespread belief in coaching and teaching that more flexibility leads to better performance, but there is little empirical evidence to back this up [1].

Hamstring injuries are the maximum not unusual place injuries in athletes and may be tough to deal with effectively, frequently ensuing in substantial absences from the sport. Treatment of those accidents is complex with the aid of using a recurrence charge of as much as 34% in high-pace strolling sports activities including football, soccer, rugby and track. A developing frame of proof indicates that muscle imbalances (unilateral variations and quadriceps to hamstring ratios) can be an crucial danger thing for hamstring accidents Flexibility boundaries have additionally been defined as a danger thing for hamstring accidents. [2] Flexibility may be restrained with the aid of using so-called "active" or "contractable" and "passive" or "non-contractable" constraints. Muscle contraction is one in every of those "active/counterproductive" constraints. Flexibility may be constrained via way of means of the voluntary and reflexive manage of the

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muscle in the course of stretching, mainly speedy stretching, which turns on the "stretch reflex." When a muscle is stretched rapidly, a receptor referred to as a "spindle" reasons the muscle to reflexively agree to save you the stretch. Flexibility is likewise constrained via way of means of "passive/non-contractile" limitations withinside the shape of connective tissue.<sup>[3]</sup> Loss of muscle flexibility now no longer simplest reduces the extent of function, however additionally reasons harm to the musculoskeletal gadget because of overuse. Such accidents especially arise in multi-joint muscle groups with excessive practical tour and an excessive percent of fast-twitch muscle fibers, and it's been said that the hamstring is the maximum regularly injured multi-joint muscle withinside the human body. Stretching is a healing system that pursuits to growth smooth tissue and thereby enhance flexibility via way of means of lengthening systems which have adaptively shortened and grow to be motionless over time. Stretching techniques are treatment plans used to enhance muscle stretching to enhance ROM and may assist save you accidents in day by day lifestyles or sports activities, lessen muscle ache and enhance muscle overall performance and sports activities performance.<sup>[4]</sup> Stretching is a not unusual place pastime utilized by athletes, older adults, rehabilitation sufferers and all of us taking part in an exercising program. Muscle "tightness" consequences from an growth in anxiety as a result of energetic or passive mechanisms. Passively, muscle tissue can shorten due to postural version or scarring; actively muscle tissue can shorten because of spasm or contraction. Regardless of the reason, the sensation of anxiety limits motion and may reason muscle imbalances.<sup>[5]</sup> Stretching performance is typically defined as an boom in joint ROM: for example, knee or hip ROM is used to decide modifications in hamstring length. The maximum not unusualplace stretching technique used to boom muscle flexibility is static stretching. Static stretching efficiently will increase ROM. The largest extrade in ROMs with static stretching happens inside 15-30 seconds. Most authors claim that 10-30 seconds is enough to increase flexibility.<sup>[5, 6]</sup> trigger points are either active or hidden. The more common LTPs cause stiffness but not ache because their ache activation threshold is not reached.

ATP, nevertheless, is sudden related to pain, which is often far from the site of its trigger point. They usually occur together with nerve, joint and inflammatory enigma. They lead to increased fatigue (characterized by increased stiffness, reduced flexibility, poor posture, less function and increased risk of falls) throughout life. Myotherapy aims to eliminate ATP activation to relieve the body of muscle-related pain and treat LTP to restore full muscle movement and function.<sup>[7]</sup> Regardless of your age, a physiotherapist has the education and competencies to become aware of trigger points and apply different techniques to provide effective treatment. It may be carried out in a preventive, corrective or restorative manner. Myofascial trigger points are common musculoskeletal pain in primary care. Trigger points are discrete, focused, hyperexcitable points placed in a dense group of skeletal muscle. The patch is painful while pressed and may motive pain, tenderness, motor disorder and autonomic phenomena. Several histopathological mechanisms were proposed to account for the improvement of trigger pints and next ache styles in athletes, however medical proof is lacking. Dry Needling (DN) is a method used to deal with disorder of skeletal muscle, fascia and connective tissue and to lessen chronic peripheral nociceptive pastime and decrease or repair impairment of frame shape and function, ensuing in advanced overall performance and participation. Deep DN of TrPs is related to decreased neighborhood and referred pain, advanced variety of motion, and decreased irritability of TrPs each domestically and remotely. DN normalizes the chemical environment, reduces Ach stores, stimulates the local twitch response (LTR) and skeletal muscle pH, and restores local circulation.<sup>[8-13]</sup>

Dry needling is a relatively new method in the field of physiotherapy. It uses solid filaments as sterile needles that are inserted percutaneously into the target tissue to produce a therapeutic effect. Dry needling is a

proven treatment option for myofascial trigger points. The therapeutic effects of dry needling include differentiation of trigger points, general healing effect and analgesia.<sup>[14, 15]</sup> Myofascial trigger has three important properties: excessive release of acetylcholine, shortening of sarcomeres and sensitizing agents.<sup>[16]</sup> When the needle is inserted immediately into the trigger point (Deep Dry Needling: DDN), a small muscle contraction happens called the local twitch response (LTR). LTRs normalize the chemical surroundings of active MTrPs and right away lessen trigger point-related endplate noise.<sup>[14]</sup>

The recovery results are multifactorial without delay after the needle is inserted into the skin; there are sign of elevated capillary permeability, which reasons speedy nearby vasodilation. Insertion of the needle reasons minor harm to the epithelium. This results in a wound potential that persists and provides electrical stimulation for days until this miniature wound heals.<sup>[17]</sup> It is possible that damage accelerates healing by triggering galvanotaxis (polarity-controlled cell migration) and many other biochemical events.<sup>[18]</sup>

Once inserted, the needle can be rotated using the rotation and plunge. Needling has been found to cause collagen to curl and pool around the needle. Pulling the collagen in the direction of the needle reasons an energetic cell reaction in connective tissue fibroblasts even numerous centimeters farfar from the needle inside mins of turning the needle. This mechanical signaling to fibroblasts can cause loads of cell and extracellular activities that cause neuromodulation and healing.<sup>[19]</sup>

Injecting a needle into the skin also releases cortisol, the body's own steroid. Elevated local cortisol stages have a catabolic impact on connective tissue, which stimulates tissue regeneration and scar breakdown.<sup>[18]</sup> MTrPs are palpable hardened regions of muscular tissues which are painful to transport and feel. Years ago, light microscopic studies already showed so-called contractile nodes in MTrPs. they are localized thickening of individual muscle fibers caused by small contractions of sarcomeres.

A widely held hypothesis for the origin of MTrP requires that muscle damages the neuromuscular endplate in order that it over secretes acetylcholine. The ensuing depolarization of the muscle mobileular membrane produces a contraction knot that compresses adjoining capillaries, inflicting nearby ischemia. Ischemia, on the opposite hand, ends in the discharge of nociceptor-touchy materials into tissues, and is the reason the sensitivity of MTrP to pressure. Substances of this kind had been discovered withinside the MTrP of those patients. This putative mechanism leaves many questions unanswered, however is presently the simplest complete speculation for the starting place of MTrP.<sup>[20, 21, 22]</sup> The aforementioned MTrP-related symptoms often cause patients to misplace pain. In such manner, the physiotherapist need to consciously search for the actual supply of the pain via way of means of palpating the muscle after which deal with it accordingly.<sup>[23]</sup> In this study latent trigger points which don't cause pain were palpated upon compression of the muscle and were needled with the dry needling, after that static stretching was given to that muscle. We investigate the hamstring muscle with its muscles is semitendinosus, semimembranosus and bicep femoris were needled and stretched.

This type of research is hardly done by any researcher in the past, except some few. It needs a high quality researches for the accuracy of the results.

## METHODS

**Subjects:** In this study a pool of 12 subjects with an average age of 24.41 starting from 20 to 30 years, was created after meeting all inclusion and exclusion criteria. The source of the subject was Hakeem Abdul Hameed Centenary Hospital (HAHC). The subjects signed the informed consent and participated in line with the inclusion and

exclusion evaluating. These 12 subjects were subjected to two conditions on the random basis decided by a toss.

Condition 1: Static stretching and DN to right leg and static stretching to left leg (T1).

Condition 2: Static stretching to the right leg and dry needling with static stretching to left leg. (T2).

Each subject was assigned in both C1 and C2, in which one leg was subjected to Dry needling with addition of static stretching protocol (C1) and other leg was subjected to static stretching protocol (C2).

\*A simple toss decided which leg will receive which treatment, if head comes T1 will be applied to right leg, if tail comes T2 will be applied to right leg.

Before data collection, the study has been endorsed by the Institutional Ethics Board Committee of Jamia Hamdard (Deemed to be University).

The participants were measured on the plinth, with both lower extremities extended, in their supine position. By aligning them with the vertical bars of the apparatus, both superior iliac spine were positioned. Using a strap across the lower third of his thigh, an extremity that did not measure was placed on the plinth subjects was in supine position with right hip and knee flexed to 90°. During the measurement, the researcher passively moves the leg to the final position of the knee extension, defined as the point at which the researcher perceives resistance to stretch, while maintaining the 90° hip flexion position.

The protocol for dry needling treatment was set for 2day/week and for static stretching it was 5day/week with 3 repetitions of 30 seconds. The duration of the study was 4 weeks from the day of starting the treatment.

Pre-test and post-test readings were taken by the researcher and were recorded for the analysis.

Dry Needling was given to the muscles semimembranosus, semitendinosus and biceps femoris after identification of latent trigger points in the muscles. In muscles where the latent trigger points were not readily palpable then the most common sites for development of trigger points according to Travell and Simmons were treated with Dry Needling. Not all points were treated in a single given session. The points were treated on a rotation basis, so that during the whole study period one point would have received dry needling between 3 to 6 times. [24]

The subjects participated in the study were monitored for the static stretching and a maintenance log sheet was used whether the subject has done the stretching or not.

### STATICAL ANALYSIS

The data analysis was done by SPSS software system (Version 17). The dependent variable for statical analysis was active knee extension of the knee joint. To find out the effectiveness of the dry needling with addition of the static stretching versus static stretching in muscle flexibility-test was used to find out the difference between C1 and C2 was analyzed for significance keeping the value of  $p=0.05(95\%)$  (Confidence interval). The differences within C1 for change in AKE was verified for significance using the paired t-test applied for pre and post test for the value of  $p=0.05$  (95% confidence interval). After the application of t-test was applied to compare the difference in C1 and C2, the effects of dry needling with addition of static stretching (C1) was found significant in regaining flexibility of the muscle.

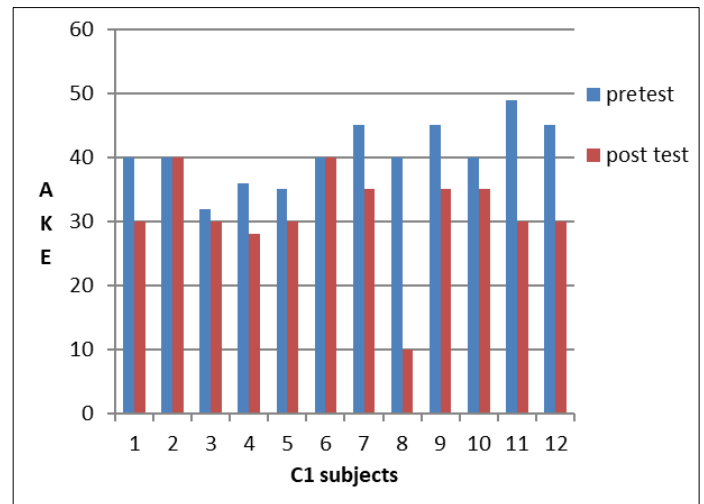
### RESULTS

A t-test paired was used to analyze the data for each. After analyzing the data, we came to know that C1 group (Dry needling in addition with static stretching) shows significant value ( $p=0.003^{**}$ ) Tab. 1and Fig 1, while as C2 group (only static stretching) shows a p value of ( $p =.285$ ).<sup>NS</sup> Tab.2 and Fig.1

Thus this research indicates that D.N intervention with static stretching to be more effective and significant in improving flexibility results than static stretching alone. The data was analyzed with paired t test. The test showed the Mean difference of (C1 pre =40.58 and C1 post= 31.08) with SD value for (C1pre =4.873 and C1 post =7.775) with a significant t-test value of 3.809<sup>\*\*</sup>.Whereas the mean value for (C2pre=40.08 and C2post=37.83) with SD value for (C2 pre=4.889 and C2 post=5.042) with a t-test value of 1.125<sup>NS</sup>. Tab.3, Fig. 3.

**Table 1:** C1 group (Dry needling in addition with static stretching)

| I.D  | Age | Leg (R/L) | PRE | Post 4 |
|------|-----|-----------|-----|--------|
| As01 | 24  | Right     | 40  | 30     |
| As02 | 23  | Left      | 40  | 40     |
| As03 | 30  | Right     | 32  | 30     |
| As04 | 25  | Left      | 36  | 28     |
| AS05 | 20  | Right     | 35  | 30     |
| As06 | 23  | Left      | 40  | 40     |
| As07 | 21  | Right     | 45  | 35     |
| As08 | 30  | Right     | 40  | 10     |
| As09 | 27  | Right     | 45  | 35     |
| As10 | 23  | Left      | 40  | 35     |
| As11 | 21  | Left      | 49  | 30     |
| As12 | 26  | Left      | 45  | 30     |



**Figure:** C1 group (Dry needling in addition with static stretching)

**Table 2:** C2 group (only static stretching)

| I.D  | Age | Leg (R/L) | PRE | Post 4 |
|------|-----|-----------|-----|--------|
| As01 | 24  | Right     | 35  | 35     |
| As02 | 23  | Left      | 40  | 40     |
| As03 | 30  | Right     | 33  | 40     |
| As04 | 25  | Left      | 35  | 35     |
| AS05 | 20  | Right     | 35  | 34     |

|       |    |       |    |    |
|-------|----|-------|----|----|
| As06  | 23 | Left  | 40 | 40 |
| As07  | 21 | Left  | 40 | 45 |
| As08  | 30 | Left  | 45 | 25 |
| As09- | 27 | Right | 40 | 40 |
| As10  | 23 | Right | 45 | 40 |
| As11  | 21 | Right | 48 | 40 |
| As12  | 26 | Right | 45 | 40 |

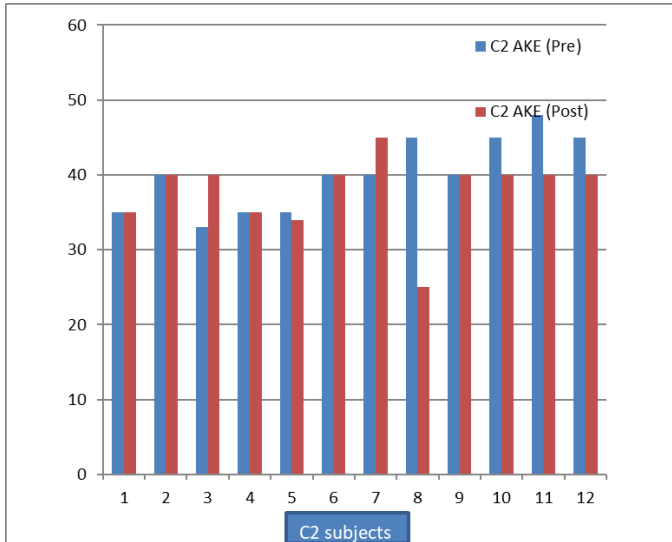


Figure 2: C2 group (only static stretching)

Table 3: Mean value for (C2pre=40.08 and C2post=37.83) with SD value for (C2 pre=4.889 and C2 post=5.042)

|         | Mean  | Std. Deviation | t-value             | P-value (sig) |
|---------|-------|----------------|---------------------|---------------|
| C1 pre  | 40.58 | 4.833          | 3.809**             | .003          |
| C1 post | 31.08 | 7.775          |                     |               |
| C2 pre  | 40.08 | 4.889          | 1.125 <sup>NS</sup> | .285          |
| C2 post | 37.83 | 5.042          |                     |               |

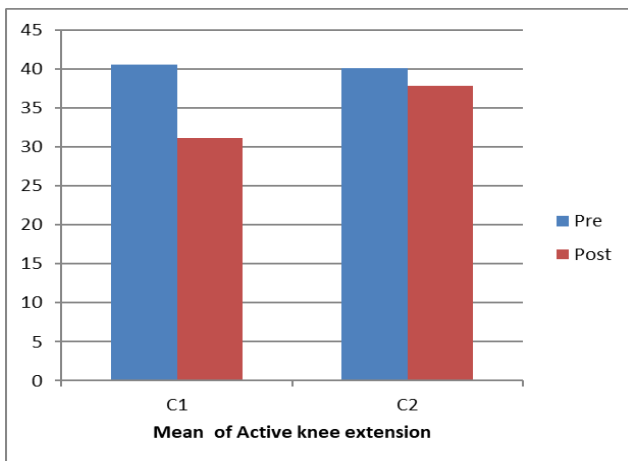


Figure 3: Mean value for (C2pre=40.08 and C2post=37.83) with SD value for (C2 pre=4.889 and C2 post=5.042)

## DISCUSSION

This research intends to study the effectiveness of addition of dry needling to a standard static stretch with static stretching alone.

Muscles are always subjected to overuse, overload stresses or imbalance position, because their pain activating threshold has not been reached, latent trigger points are created which cause stiffness but do not result in pain. They lead to increase decrepitude through life (characterized by more stiffness, less flexibility, poor posture, less function and more prone to injury). Pain can develop as the flexibility wears off. In case of C1 we are treating these latent trigger points and release them with dry needling. Before dry needling we palpate these latent trigger points by compressing the muscle and did dry needling under sterile conditions. Then the stretching of the muscle was given so as to increase the stretch tolerance which indirectly increases the flexibility.

While in C2 only static stretching was given which can only increase the stretch tolerance but cannot treat trigger points. As Konrad and Tilip M in their research discussed that structural changes in the muscle tendon unit could not explain an increased range of motion [25], which might have been caused by a rise in stretch tolerance.

Latent trigger points unless compressed, they generally do not cause pain. A trigger point may be triggered by a lot of things. An old injury that periodically re-surfaces (that "trick knee" or low back "going out") may very likely be due to latent trigger points "waking up" and becoming active when aggravated by muscle overload, a cold draft, fatigue, infection, illness, or stress.

Reduced hamstring flexibility results from formation of trigger points and the shortening of sarcomere length. Sports players continuously suffer from hamstring problem; this reduces their performance on the field.

In designing the intervention we followed the methods described by Bandy *et al* for static stretching and travel & Simon's classic text "the trigger point manual for dry needling. We used a pre test –post test interventional experimental study design for simple and effective analysis.

To quantify the outcome of our study we use active knee extension (AKE) measured by goniometer described by Norkin and white, which reflects the improvements in extension of knee.

During presentation of this study as a research topic the researchers had to convince the ethical committee regarding two important issues: First was about the safety of dry needling. The researchers performed dry needling as instructed by the American Physical Therapist Association (APTA) dry needling resource paper, following the safety precautions by the book.

Stretching is a popular intervention for hamstring flexibility treatment among athletes and other fitness involved persons. On the other hand, the use of dry needling is not so common. The modality claims to provide quick and lasting relief from trigger points. Although Dry Needling involves piercing the skin with a needle, it was generally well received by our subject population. Five participants from the needling group complained of post needling soreness, three after their very first session, and another two half way through the protocol.

12 subjects with bilateral hamstring tightness who met the inclusion criteria were assigned into two conditions C1 and C2. C1 received Dry Needling with static stretching and C2 received static stretching; both C1 and C2 were treated 2 times a week, for 4 weeks. Subjects were prescribed a home programme of self static stretching of both legs same as done in the treating session. A log book was maintained for the record of the treatments given to the patient which includes date of treatment, record of treatment given to which leg, home stretching done or not.

The C2 group also shows positive improvement to some extent but was not statistically impressive. Again, though both the treatment

produced improvement, but dry needling was significantly better in improving flexibility of hamstring.

The reason for this is not exactly known as such kind of researches has not been investigated in the past, we can say that tightness or reduced range of motion is due to of tight muscles and formation of trigger points, stretching can reduce the tightness of the muscle, but cannot be effective on trigger points ,while Dry needling is best effective in case of trigger points ,which gives an immediate significant effect . The reason for static stretching protocol as non-significant may be that the stretching is not effective on trigger points and the duration of the stretching needs to be more for better results.

The results of this research shows dry needling in addition of static stretching is an effective intervention for decreasing hamstrings tightness, effects are significantly better than stretching alone. This study supports and recommends the use of dry needling with addition of static stretching for improvements in hamstrings flexibility.

## CONCLUSION

After discussion we are in a position to accept our hypothesis that dry needling in addition of static stretching is effective in increasing flexibility of the muscle. In C1 Latent trigger points are treated by dry needling (which augments the static stretching) and then muscle is stretched by static stretching which increases the stretch tolerance , while in C2 the static stretching is not sufficient alone in increasing flexibility because of untreated trigger points left in the muscle can be responsible for decreasing flexibility.

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## Conflict of interest

The authors reports no conflicts of interest.

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