

EFFECT OF PNF STRETCHING VERSUS STATIC STRETCHING ON CALF MUSCLE FLEXIBILITY: A COMPARATIVE EXPERIMENTAL STUDY

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ABSTRACT

Background: muscle tightness is the most common disorder in normal healthy Individuals. Calf muscle tightness is very common occurring condition. Stretching is form of physical exercise in which a specific muscle or tendon (muscle group) is deliberately flexed or stretched in order to improve the muscle's felt elasticity and achieve comfortable muscle tone.

Purpose of the study is to compare effectiveness of PNF stretching and static stretching in improving the calf muscle flexibility.



Materials and Methods: 30 subjects (n=30) between 5-22years (male and female) with calf tightness were randomly divided in to two groups equally. Each group consists of 15 subjects. Calf flexibility for each group was measured using the Silfverskiold test. Subjects of A group treated with PNF stretching technique, whereas the subjects of group B were treated with static stretching. Treatment was given for 15 days.

Results: The PNF technique (group A) the value of the dorsiflexion is increased at the end of the 15 days (19.86) compared to baseline value (13.07).

Conclusion: The both PNF and static stretching techniques are effective in improving the calf muscle flexibility but the PNF stretching is more effective compared to static stretching to improve calf muscle flexibility.

KEY WORDS: Calf tightness, PNF stretching, Static stretching, Calf flexibility.

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Access this Article online	Journal Information
Quick Response code  DOI: 10.16965/ijpr.2018.197	International Journal of Physiotherapy and Research ICV for 2016 86.93 ISSN (E) 2321-1822 ISSN (P) 2321-8975 https://www.ijmhr.org/ijpr.html DOI-Prefix: https://dx.doi.org/10.16965/ijpr 
	Article Information
	Received: 26 Nov 2018 Peer Review: 27 Nov 2018 Revised: None
	Accepted: 10 Jan 2019 Published (O): 11 Feb 2019 Published (P): 11 Feb 2019

INTRODUCTION

The length of the muscle tissue is thought to play an important role in the effectiveness and efficacy of human movement [1]. Muscle tightness is the most common disorder in healthy individuals [1]. Calf muscle tightness is very commonly occurring condition [2]. Increasing flexibility through stretching is one of the basic tenets of physical fitness [3].

There are many techniques for stretching in general, but depending upon which muscle group is being stretched [4]. There are four different types of stretching: ballistic, Proprioceptive neuromuscular facilitation and static stretching [5]. Stretching properly and in the correct time frame of one's workout is vital for gaining all the benefits from these stretches [6]. Its important for a person to perform each of

the four types of stretching properly to gain the benefits [7].

Other research concludes that active stretching routines will reduce muscle-tendon viscosity and increase muscle compliancy and elasticity.[8] other theories included claim active static stretching increase inflow of Ca²⁺ from extra cellular spaces into muscles being stretched [9]. The increase of Ca²⁺ reduced the muscle twitch tension by up to sixty percent [9]. Reasoning behind this claim is that increased level of Ca²⁺ in resting muscles predisposes individuals to fatigue quicker than Individuals who did not stretch [9].

PNF stretching: PNF stretching, or proprioceptive neuromuscular facilitation stretching, are stretching techniques commonly used in clinical environments to enhance both active and passive range of motion with the ultimate goal being to optimize motor performance and rehabilitation [8].

Technique:

Contract Relax: Passive placement of the restricted muscle into a position of stretch followed by an isometric contraction of the restricted muscle [10]. Most isometric contractions in PNF stretching techniques should be held for a minimum 3 seconds [10]. at a sub maximal effort (20-50% of maximal effort) to avoid muscle fatigue and injury [11].

Static stretching: It involves passively stretching a muscle to the period of mild discomfort and holding it for an extended length of time [12]. Static stretching, however, is beneficial for increasing flexibility, should be performed at the appropriate times, such as the beginning of a season, or separate from workout or practice [13].

MATERIALS AND METHODS

An experimental study was conducted between two group in 6 month duration.

Inclusion criteria: (i) age 5-22 years (male and female). (ii) Subject should not have measurable ankle edema. (iii) Subject should not have any effect from any previous acute ankle injury. (iv) Subject should have ability to stand in a static position for two minutes at a time.

Exclusion criteria: (i) Subjects having any kind

of known muscular skeleton problems. (ii) Subjects with any congenital deformity.

Tools used for study: (i) wooden table couch. (ii) Universal goniometer.(iii) watch

Procedure: Subjects with calf tightness were selected through silfverskiold test for the study.30 subjects (male and female) are included. The subjects were randomly divided into 2 groups by using random sampling method. Each group consists of 15 subjects. Treatment was given for 15 days. Prior consent of subject was taken before assessment. Group A consist of 15 subjects who received PNF stretching technique, patient is supine lying position with straight leg. Therapist moves the leg in the direction of dorsiflexion to the point of discomfort. Then the isometric contraction of restricting muscle, at this point give the instruction that 'try to take your gently foot up, against my resistance, using your maximal strength. The therapist should apply just enough force so that the foot remain static.no motion is intended by either patient or therapist. This is the hold phase and last for 20 seconds. After holding the contraction for enough time therapist ask the patient to relax and the foot is repositioned passively to the new limit of range and procedure is repeated. Then again take the foot passively to the new barrier point and repeat the procedure. This whole procedure is repeated 3 times per session for 15 days. Group B consist of 15 subjects who received static stretching technique, subject is in standing position facing a wall, with the hand placed against the wall at the shoulder level. Leg should be placed about few inches from wall inclined his/her body forwards the wall keeping the heel on the floor. Maintain the stretch for 30 seconds, performing this stretches 3 times per session for 15 days.

RESULTS

Graph 1: Above graphical view shows mean values of PRE PNF (13.07) and POST PNF (19.86).

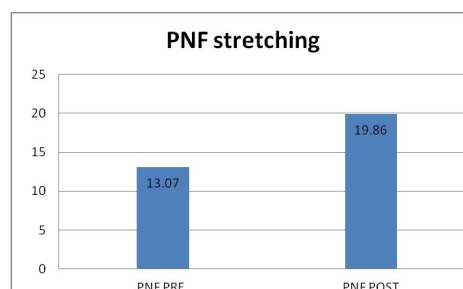


Table 1: Above table shows t' value of PNF stretching.

Calculated 't' value	25.97
Table 't' value	2.15

Graph 2: Above graphical view shows mean values of Static PNF (13.73) and Static PNF (18.73).

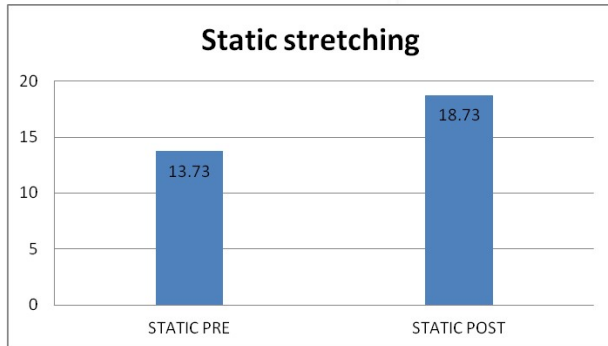


Table 2: Above table shows t' value of Static stretching.

Calculated 't' value	7.246
Table 't' value	2.15

Graph 3: Above graphical view shows mean values of Post PNF and Post static stretching

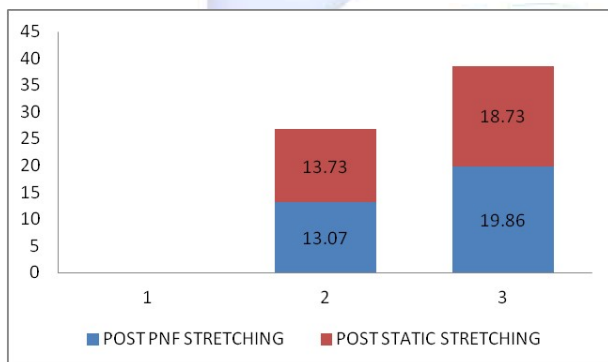


Table 3: Above table shows mean values of Pre and post treatment of PNF and Static stretching.

Group	Mean (Pre-treatment)	Mean (post-treatment)
PNF	13.07	19.86
Static stretching	13.73	18.73

The results show that the mean difference of PNF is 6.8 and mean difference of static stretching is 5.8 which suggest that static and PNF both are effective to improve calf flexibility but PNF stretching is more effective compared to static.

DISCUSSION

The present study comparison between PNF stretching and static stretching technique to improve the calf muscle flexibility is done. In PNF technique (group A) the value of the dorsiflexion is increased at the end of 15 days (19.86) compared effective to the baseline value (13.07). This suggest that the PNF is effective

to improve the calf muscle flexibility. Where else in static stretching the value of dorsiflexion is increased at the end of 15 days compared to the baseline value (13.73). This suggests that static stretching is also effective to improve calf muscle flexibility. According to Lucas et al. studied the effect of static, dynamic and PNF stretching technique on the flexibility of hamstring – gastrocnemius muscle on 63 college women. The finding indicates all 3 method of flexibility training produced significant improvements when pretest and posttest mean scores were compared.

According to Sady et al. compared the effect of static and PNF stretching technique for hamstring muscles on the flexibility. A Leighton flexometer was used to measure ROM at the joint traversed by the tested muscle group. Only the PNF group had an increase in flexibility greater than the control group [15].

According to Bradley PS et al. study the effectiveness of static, light ballistic, PNF stretching on strength performance. PNF stretching enhances the strength performance while other form of stretching does not because PNF stretching encourage the muscle inhibition [14].

So our results is also supporting that PNF stretching is more effective to improve the flexibility of muscle as compare to other form of the stretching [15].

CONCLUSION

This study concluded that both PNF and static stretching techniques are effective in improving the calf muscle flexibility but PNF stretching is more effective compared to the static stretching to improve calf muscle flexibility.

ACKNOWLEDGEMENTS

We would like to express our heartfelt gratitude to all those who have helped us give our Abstract thoughts a perceivable form. Lastly, we extend our gratitude to all the subjects who have participated in this project.

Conflicts of interest: None

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How to cite this article:

Aarti Panchal, Deepti Sabhaya, Parekh Maitri. EFFECT OF PNF STRETCHING VERSUS STATIC STRETCHING ON CALF MUSCLE FLEXIBILITY: A COMPARATIVE EXPERIMENTAL STUDY. *Int J Physiother Res* 2019;7(1):2980-2983. DOI: 10.16965/ijpr.2018.197