



COMPARATIVE STUDY OF THE EFFECT OF DYNAMIC OSCILLATORY STRETCHING AND PNF STRETCHING ON HAMSTRING TIGHTNESS.

Physiotherapy

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ABSTRACT

Background: Flexibility is an ability to move a single joint or a series of a joint smoothly and easily through and unrestricted, pain free range of motion. Flexibility in hamstrings muscle group is necessary for the hip and knee movements as well as in many functional activities and in prevention of injury. Different studies suggested that Dynamic oscillatory stretching and PNF stretching both have been effective in improving the hamstring flexibility but there is no literature found in between these two techniques which one is more effective. So this study aims to determine which type of stretching technique is more effective in improving hamstring flexibility. **Material & Method:** 60 subjects were selected on the basis of inclusion criteria and divided into two groups. Group A was given dynamic oscillatory stretching and group B was given PNF stretching (hold relax) both for 5 days/ week for 4 weeks. The values of sit and reach test were taken pre and post treatment. Statistical analysis was done and the results were tabulated. **Conclusion:** The findings of the study indicates that both dynamic oscillatory stretch and PNF are equally effective for improving hamstring extensibility.

KEYWORDS

INTRODUCTION :

Flexibility is an ability to move a single joint or a series of a joint smoothly and easily through and unrestricted, pain free range of motion.^[4]

Flexibility in hamstrings muscle group is necessary for the hip and knee movements as well as in many functional activities and in prevention of injury in which muscle group is elongated over hip and knee simultaneously.^[4] Static stretching is effective for improvement for improvement of flexibility of muscle and also strength of hamstring muscle.⁷ Flexibility in hamstrings muscle group is necessary for the hip and knee movements as well as in many functional activities and in prevention of injury.

Dynamic oscillatory stretching is similar to agonist contract-relax, in that the agonist produces the stretching force on the opposite muscle (antagonist).^{[1][7]} In addition, DOS incorporates as a modification a two-second oscillatory manual stretch at the end of the range, which is applied by the therapist to assist the agonist.^[1] Arie Michaeli et al. in 2017 conducted a randomised controlled trial to observe the effects of Dynamic oscillatory stretch technique on the length of hamstring muscle, its flexibility and tolerance to pain produced by stretching of hamstring muscle, and concluded that dynamic oscillatory stretching technique was more helpful than static stretching in order to obtain a rapid increase in length and flexibility of hamstring muscles

Proprioceptive neuromuscular facilitation (PNF) is common practice for increasing range of motion. Four theoretical mechanisms were identified: autogenic inhibition, reciprocal inhibition, stress relaxation, and the gate control theory.^[5] The study done by V.rajalexmi (2017) suggested that a combination of these four mechanisms enhance range of motion^{[4][5]}. When this stretching technique is performed consistently and post exercise, it increases range of motion. A study conducted by Funk et al. (2003) assessed the efficacy of PNF stretching versus static stretching on hamstring flexibility performed with or without exercise. The results showed that those who exercised and received PNF stretching experienced more of an increase in flexibility when compared to the baseline group and the group without exercise and PNF.

Need of study: Different studies suggested that Dynamic oscillatory stretching and PNF stretching both have been effective in improving the hamstring flexibility but there is no literature found in between these two techniques which one is more effective. So this study aims to determine which type of stretching technique is more effective in improving hamstring flexibility

AIM: To compare the effects of dynamic oscillatory stretching and PNF stretching on hamstring tightness.

OBJECTIVE

- To study the effect of dynamic oscillatory stretching on hamstring tightness
- To study the effect of PNF stretching on hamstring tightness
- To compare the effects of dynamic oscillatory stretching and PNF stretching.

HYPOTHESIS Alternate hypothesis : There will be a significant difference between the effect of dynamic oscillatory stretching and PNF stretching on hamstring tightness. Null hypothesis : There will be no significant difference between the effect of dynamic oscillatory stretching and PNF stretching on hamstring tightness

METHODOLOGY

An experimental study was carried out on 60 subjects picked by purposive sampling with age between 20 to 30 years with minimum of 10 cm of difference measured by sit and reach test. Both males and females were included in the study. Subjects with any back pain, neurological pathology, infection, tumor, osteoporosis, lumbar spine fracture, structural deformity, inflammatory disorder were excluded.

PROCEDURE: Ethical approval was taken. 60 Participants were selected on basis of inclusion criteria and divided into two groups having 30 participants each. Group A was given dynamic oscillatory stretching and group B was given PNF stretching (hold relax) both for 5 days/ week for 4 weeks.

Group A was given dynamic oscillatory stretching for 60 seconds: 2 sec x 10 repetitions x 3 sets. Group B was given hold relax technique of PNF stretch for time was 30 secs x 2 repetitions. Post test values of sit and reach test were recorded after 4 weeks and data was analysed.

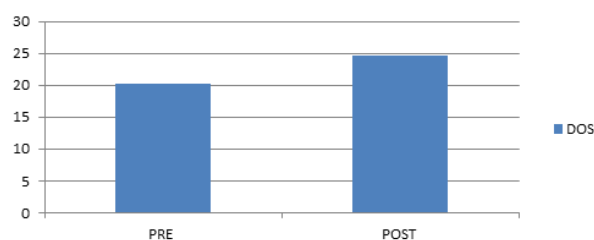
DATA ANALYSIS AND RESULT : Pre and post values of Dynamic oscillatory stretch was compared using paired t test. Pre and post values of PNF stretch was compared using paired t test. Unpaired t test used between post values of DOS and PNF stretch.

Table no 1 shows pre and post values of Sit and reach test of individuals in group A(DOS)

Category	Pre intervention		Post intervention	
	SD	MEAN	SD	MEAN
Dynamic oscillatory stretch (DOS).	2.66	20.33	2.58	24.71

P value is <0.0001 considered highly significant. t = 26.586 with 29 degrees of freedom.

DYNAMIC OSCILLATORY STRETCH

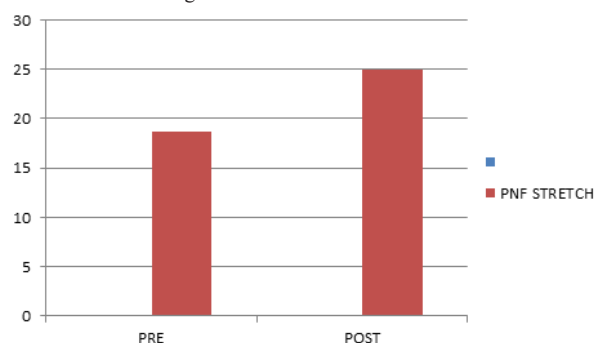


Graph 1 shows mean difference between pre and post values of Sit and reach test

Table no 2 shows pre and post values of sit and reach test of individuals in group B (PNF stretch)

CATEGORY	PRE INTERVENTION		POST INTERVENTION	
	SD	MEAN	SD	MEAN
PNF STRETCH	2.93	18.68	2.59	24.96

The P VALUE is <0.0001 , considered extremely significant. $t = 26.795$ with 29 degrees of freedom.



Graph 2 shows mean difference between pre and post values of the sit and reach test of PNF group

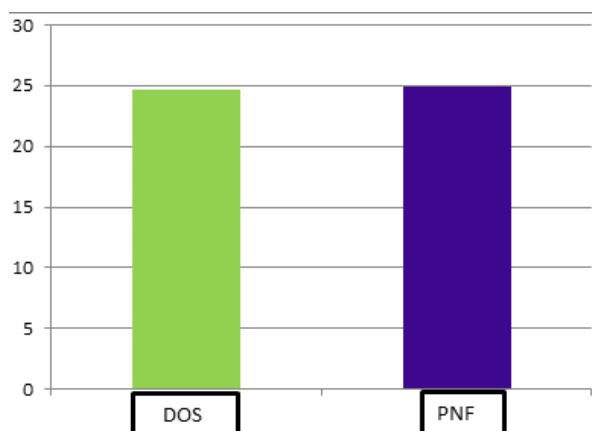
The inter group comparison of the Dynamic oscillatory technique and the PNF hold relax group was done using unpaired t test. P value is 0.71, not significant. This indicates that both dynamic oscillatory stretch and PNF are equally effective for improving hamstring extensibility.

Table no 3 shows pre and post values of sit and reach test of DOS and PNF.

	DOS	PNF STRETCH
SD	2.58	2.59
MEAN	24.71	24.96

The Inter group comparison of the DOS and the PNF group was using unpaired t test.

- The P value is >0.0001 , not significant
- t value = 0.36



Graph3 shows the mean difference between the post values of DOS and PNF stretch.

DISCUSSION

The ability of an individual to move smoothly depends on his flexibility which is the ability to move a single joint or series of joints smoothly and easily through an unrestricted pain free range of motion^[4]. Tightness is the adaptive shortening of the contractile and non contractile elements of the muscles. The hamstring are the group of muscles that have a tendency to shorten even among young, healthy individuals and in recreational athletes.

The purpose of this was to assess the effect of PNF stretch and Dynamic oscillatory stretch on hamstring tightness. 60 healthy individuals were included in the study, out of which 35 were females and 25 were males.

In group 1, individuals were given dynamic oscillatory stretch. The individuals showed improvement in the hamstring extensibility which was depicted by improvement in the values of sit and reach test; wherein the p value was <0.0001 which is highly significant. A similar study done by Arie Michaeli et al in 2017, concluded that Dynamic oscillatory was more effective than static stretch at achieving an immediate increase in hamstring extensibility. The improvement in hamstring extensibility in the DOS group can be attributed to reflex muscle relaxation and improved stretch tolerance theory.^[1]

In group 2, individuals were given PNF (hold relax) stretch. Individuals also in this group showed significant improvement in the hamstring extensibility in which the P value is <0.0001 , which indicates that the PNF stretching had a positive impact in improving the hamstring extensibility of the individual.

In a study conducted by V Rajlaxmi et al in 2017, compared the effect of four types of hamstring stretching on hamstring tightness. (Group A: 90-90 Passive stretching, Group B: 90-90 Active stretching, Group C: PNF stretching, Group D: Self stretching.)^[4] The study concluded that the group that was given PNF stretching was more effective than the other three groups with the p value <0.0001 .

On comparison between the post values of both the dynamic oscillatory stretch group and the PNF stretch group, the p value is 0.71, which is not significant. This indicates that both the groups are equally effective for improving hamstring flexibility as both the techniques have their own effective physiological effects.

Arie Michaeli (2017) concluded that Dynamic oscillatory stretching preferentially activate the descending inhibitory nor adrenergic system and exert a hypoalgesic influence on the mechanical nociceptor. Given that musculoskeletal conditions appear to involve changes in mechanical nociceptors, it is possible that DOS, due to its similarity to the mechanism of passive physiological oscillatory techniques, could effectively promote pain tolerance and subsequently increase ROM^[1]. Study conducted by V. Rajlaxmi (2017) the PNF stretch helps to improve the range of motion using mechanisms such as autogenic inhibition, reciprocal inhibition stress relaxation and gate control theory.^{[4][6]}

A study conducted by Funk et al. (2003) assessed the efficacy of PNF stretching versus static stretching on hamstring flexibility performed with or without exercise. The results showed that those who exercised and received PNF stretching experienced more of an increase in flexibility when compared to the baseline group and the group without exercise and PNF.

Scott.G.Spernoga et al(2001) in his study showed that Hold-Relax technique is found to be effective in increasing the flexibility of hamstrings.

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