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Effect of Cryotherapy & Active Stretching Together and Active Stretching Alone for Improving Hamstring Flexibility in Asymptomatic Individuals

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ABSTRACT

Study Objective: To know about the effects of cryotherapy and active stretching together and active stretching alone for improving hamstring flexibility in asymptomatic individuals.
Method: 22 subjects were participated in study of the age 18 to 40. Subjects were randomly and equally assigned to static stretching and cryotherapy (group 1) and only active stretching (group 2). Subjects in each group were given stretching and cryotherapy for three weeks. Pre and post assessment of ROM was measured by the KEA, SLR and Sit and reach test.
Results: After three weeks of intervention there was a significant difference between pre intervention and post intervention score in both the group but in group 1 showed significant difference between KEA, SLR and SRT variables.
Conclusion: Subject who received active stretching and cryotherapy showed better improvement than the control group who received only active stretching. Hence it can be concluded that active stretching along with cryotherapy can improve hamstring flexibility than the active stretching only.

Key words: Cryotherapy, flexibility, ROM, active stretching.

INTRODUCTION

Flexibility is one of the key elements in musculo-tendinous unit. It's the ability of body tissue which determines the range of motion without an injury. Good flexibility could help in preventing muscular and skeletal injury. Flexibility is also important for sports fitness and ADL activities. [1] It is directly proportional to the range of movement at a specific joint. If hamstring flexibility is less; then it hampers range and movement mainly hip extension and knee flexion. Hamstring is two joint muscles. It consists of semi-membranous, semi-tendinous, biceps femoris located on posterior aspect of thigh and have greater tendency to shorten. [2] If hamstring muscle is tight then it will increase the chance of injury, then it has an effect on the individual performances. [3]

The hamstrings also play a major role in maintaining body posture. Shortening or tightness of the hamstrings affects body alignment, leads to LBP, Musculoskeletal pain, [4] [5] [6] muscle strain, patellar tendinopathy, patellofemoral pain. There is progressively decrease in flexibility with increase age because of change in elastic property of hamstring. If we talk about the prevalence of hamstring muscle tightness then it is fairly high [7][8]. The hamstring muscles tightness is an important factor to obstruct performance in daily and sporting activities.

A few investigations have demonstrated that hamstrings flexibility is better with stretching. [9] There are different types of

stretching like static stretching, ballistic stretching, and PNF techniques. [10] Passive stretching and active stretching techniques are most common and easy to apply at home exercises. [11] Active stretch is a type of dynamic stretch where, agonist muscle contract and antagonist muscle relax because of reciprocal inhibition. [10] To improve the hamstring flexibility active stretching is one of the methods in many strategies, while performing the stretching, it elongate muscle fiber.

There are various treatment were used to describe for improving hamstring flexibility but effect of cryotherapy with active hamstring stretch is limited. During clinical application cryotherapy are used in physiotherapy. It also used as a treatment for various purposes such as acute injuries and for relieving pain [12] [13]. It is also improves flexibility by reducing pain in muscle and muscle guarding. It inhibiting muscle spasm and enhance joint mobility by reducing pain. [13]

MATERIAL AND METHODS

Participants:

Sample of convenience of 22 limited hamstring flexibility. Subjects were selected from the Galgotias University, Greater Noida. Subject who fall in inclusion criteria and ready to involve in the therapy program were selected. Inclusion criteria consist of tight hamstring, individuals age lie between 20 and 40, Individuals with no history of knee and hip injury, neurological impairment and orthopaedic condition affecting hamstring flexibility.[14, 15]

Procedure:

Demographic data, details of the subject collected by through the data collection form.

Subject fair randomly located into following two groups by lottery system. Subject in group 1 intervention group (N=11) received active stretching hold with 30 seconds three times per day and Cryotherapy for 15 minutes for three weeks [16,17]. In group 2 controlled group (N=11) received active stretching for same duration.

For measuring KEA subject position was supine. Hip and knee brought to 90 degree of flexion. Goniometer consists of Fulcrum, movable & fix arm. Fulcrum kept on lateral epicondyle & stationary arm over femur & movable arm over the shaft of tibia. Ask the subject to extend the knee till a stretch was felt. [11]

Procedure for measuring SLR subject was in supine position. Fulcrum was placed on the greater trochanter, & fixed arm parallel to the mid axillary line & movable arm parallel to the lateral condyle of femur.

Procedure for measuring seat and reach test, position of subject was sitting on the floor without shoes in v shape, heels was apart about 20 cm. Thumb was clasped, palm faced downward and placed over the measuring tape. Subject slowly reached forward movement was smooth and without bouncing. Here, the subject stays for 2 second. The test was done twice with a break. The best trail was recorded in centimetres.

Instrumentation

Ice pack, marker pen, Digital clock, goniometer, Inch tape was used during the outcome measures and intervention.

Outcome measures: SLR, sit & reach test, KEA to measure hamstring extensibility were used as outcome measures to compare the effectiveness of cryotherapy and active stretching and active stretching alone. Assessment of both group 1 and 2 measures 1 day earlier to initiate the training. Post assessment was done at the last day of training. For measuring kea subject starting position was supine. Hip and knee were in 90 degree of flexion. Fulcrum of goniometer lies over lateral epicondyle, stationary arm over lateral thigh and movable arm in respect to tibial shaft. For the flexible hamstring angle should be 20 degree. Ask the subject to extend the knee till a stretch was felt. Procedure for measuring SLR, Subject was in supine position. Fulcrum lies

over greater trochanter, fixed arm with respect to mid axillary line & movable arm parallel to the condyle of femur in lateral side. Procedure for measuring seat & reach test, the subject sit on the floor without shoes in v shape, heels was apart about 20 cm. Thumb was clasped, palm faced downward and placed over the measuring tape. Subject slowly reached forward movement was smooth and without bouncing. Here, the subject stays for 2 second. The test was done twice with a break. The best trail was recorded in centimeters

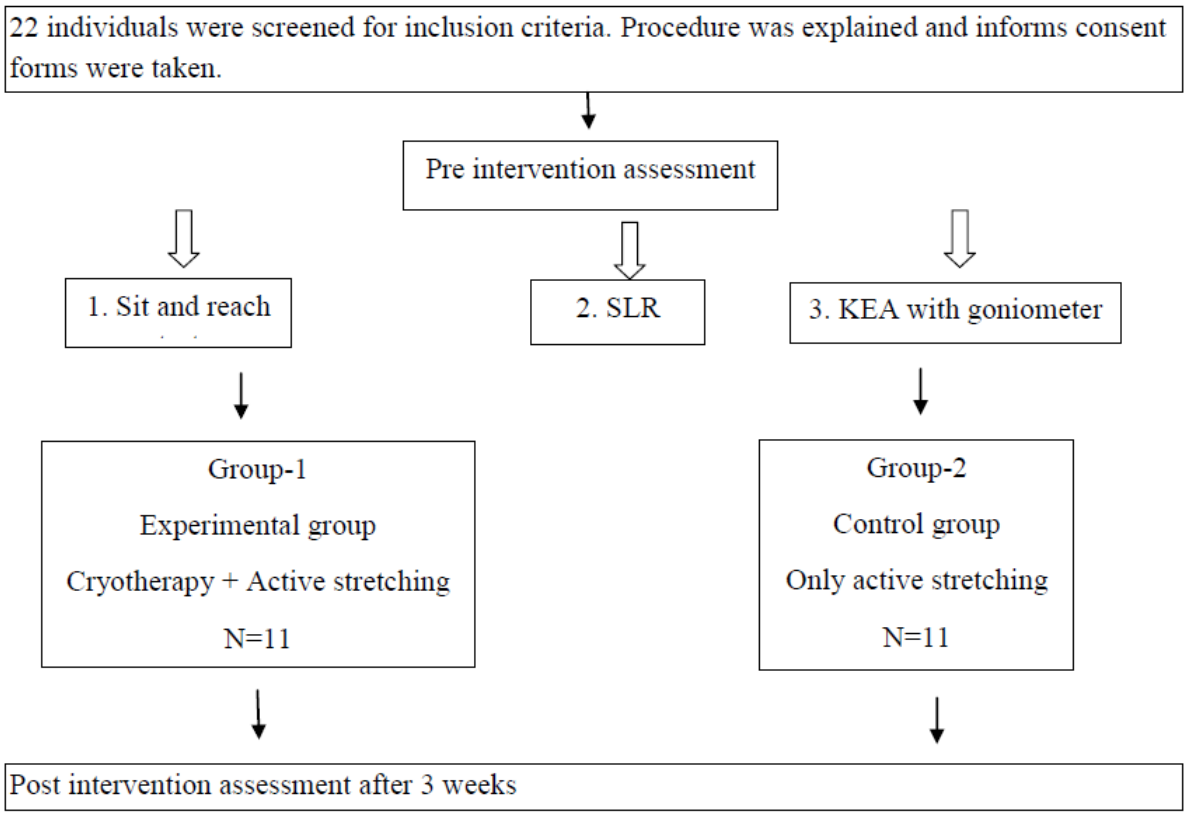
Intervention

Training of group 1

The Intervention for group 1 received active stretching and cryotherapy. Position of participant was standing, one foot was in contact with floor & heel of another foot was placed at the edge of chair with toes faces upward. After then flex forward by maintaining spine in neutral position until stretch felt in the thigh posteriorly. The knee fully extended and maintained this position for thirty seconds. Repeat it three times daily after then kept cryotherapy on the posterior thigh for 15 minutes for three weeks.

Training of group 2

Intervention for group 2 received active stretching only, same as above. No cryotherapy was given to group 2.



Data analysis:

Statistic were done using IBM statistical package for SPSS software version 21. Analyses were done for 22 subjects to complete the study. The physical characteristics data of the subject including age and gender that descriptive summarised. Analysis between group check by Independent T-test whereas, paired T-test performed within the group 1nalysis between pre-intervention and post-intervention score for both the groups for all the dependent variables. [13]

RESULT

There were 22 participants in this study. Mean and SD of gender and age for both groups shown in table 1. Active stretching and cryotherapy were independent variables. SLR, SRT, KEA were dependable variables. The comparison of pre-intervention of group 1 and group 2 is shown in below table-2. The comparison of pre intervention and post intervention scores of group 1 and group 2 showed significant difference in table 3 and table 4.

Table1: Demographic details of Group-1 and Group-2 are:

Variable	Group-A (N=11)	Group-B (N=11)
	Mean+/- SD	Mean+/-SD
Age group	23.73+/-1.737	22.73+/-1.679
Gender(male/female)	4/7	10/1

Table 2: Comparison of pre-intervention scores of Group 1 and Group 2

Variables	Group 1 (N=11)		Group 2		t-value	p-value
	Mean	SD	Mean	SD		
KEA RIGHT	60.45	5.97	59.36	11.11	0.28	0.77
KEA LEFT	57.55	8.19	57.64	10.46	-0.02	0.98
SLR RIGHT	40.91	3.01	45.45	8.79	-1.62	0.12
SLR LEFT	42.73	3.43	42.82	6.29	-0.04	0.96
SRT	52.38	6.23	59.97	11.74	-1.89	0.73

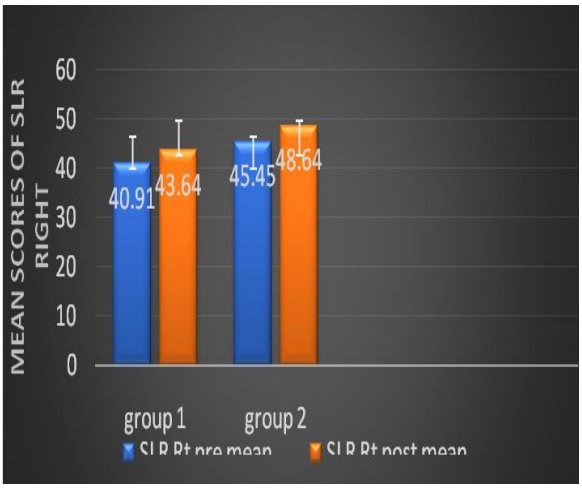
Table 3: Comparison of pre and post intervention scores of Group 1

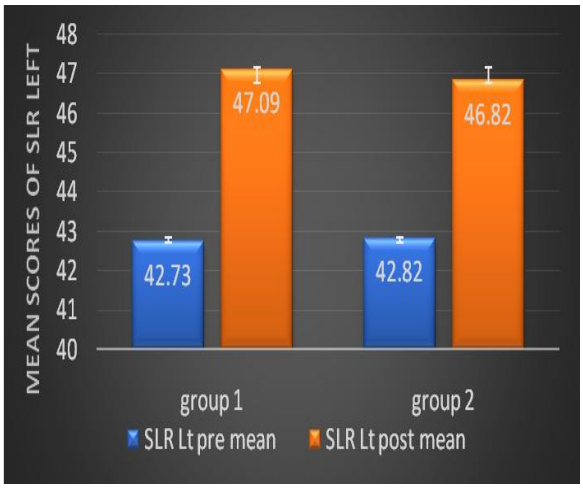
Variables	Pre intervention scores		Post intervention scores		t-value	p-value
	mean	SD	mean	SD		
KEA RIGHT	60.45	5.97	57.18	6.78	3.53	.005
KEA LEFT	57.55	8.19	53.36	8.42	5.18	.000
SLR RIGHT	40.91	3.01	43.64	3.85	-3.62	.005
SLR LEFT	42.73	3.43	47.09	6.00	-3.68	.004
SRT	52.38	6.23	56.30	5.53	-3.22	.009

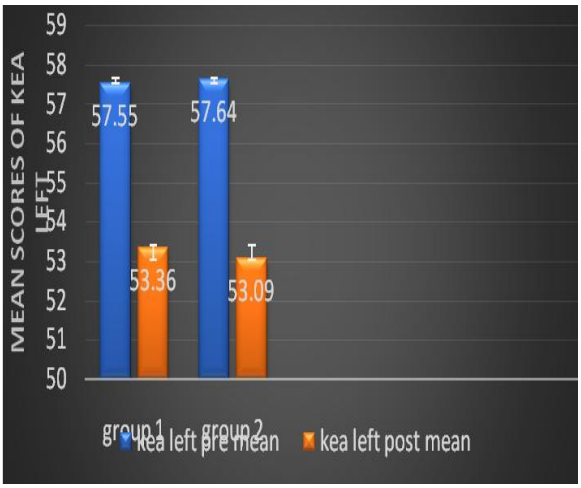
Table 4: Comparison of pre intervention and post intervention score of Group 2

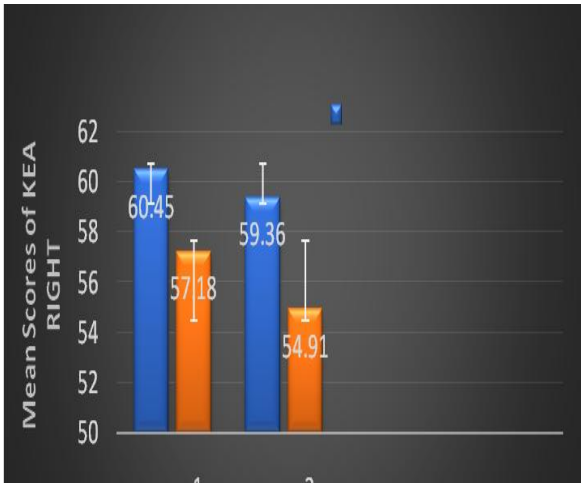
Variables	Pre intervention score		Post intervention score		t-value	p-value
	Mean	SD	Mean	SD		
KEA RIGHT	59.36	11.11	54.91	12.58	4.52	0.001
KEA LEFT	57.64	10.46	53.09	10.62	6.01	0.000
SLR RIGHT	45.45	8.79	48.64	10.97	-2.60	0.026
SLR LEFT	42.82	6.29	46.82	7.16	-4.63	0.001
SRT	59.97	11.74	65.72	12.21	-6.30	0.000

KEA= knee extension angle, SD= Standard Deviation, SLR= Straight leg raise, SRT= Sit and reach test









DISCUSSION

This study is to compare the effect of cryotherapy and active stretching together and active stretching alone for improving hamstring flexibility on an asymptomatic individual. The results disclosed changes in outcome measures. In the KEA, SLR, and SRT there were significant difference. The results suggest that KEA SLR, SRT scores were changing with time, and the changes were different for both groups. The results was shown that active stretching given with 30 seconds duration and 30 seconds rest with a frequency of 3 times per week for the duration of three weeks found to supply a significant ends up in the flexibleness of hamstring muscle. [18,19,20]

According to various study most common injured multi joint muscle is hamstring which limit the daily activity. Cold pack has found to have an effect on the elastic properties of tendon and muscle's myostatic reflex. Cryotherapy permits muscle to stretch and relax completely throughout stretching. Cold pack will increase the muscles viciousness and subsequently delay muscles capacity to spasm. The after effects of this investigation support YH Lin [12] who expressed that utilization of cold with stretching accomplished an increase of ROM in clinical practice. Cryotherapy and stretching improve performance in Sit and reach assessment and in this way can be utilized as alternative procedure for improving hamstrings' flexibility in short duration. [17]

We interpret our outcomes as supporting the utilization of ice during stretching valid for increasing hamstring flexibility. Static stretching with cryotherapy, confirmed that cryotherapy reduce discomfort throughout flexibility training. The 20 subjects were investigated and got cryotherapy on the hamstring for 15 minute, follow by static stretching of 30 seconds. Notable variability was found in the two groups of hamstring flexibility.

The other instrument utilized for this study is stop watch, goniometry it's estimation are too dependable and substantial. [21]

Limitation of our study: participant not divided according to the gender, hence further study can be done with equal number of male and female.

CONCLUSION

Subject who received active stretching and cryotherapy showed better improvement than the control group who received only active stretching. Hence it can be concluded that active stretching along with cryotherapy can improve hamstring flexibility than the active stretching only.

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Conflict of Interest: None

Source of Funding: None

Ethical Approval: Approved

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