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ORIGINAL ARTICLE

Comparative Study for Effectiveness of Cryostretching and Static Stretching on Hamstring Flexibity in Young Females

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ABSTRACT

Objective: To compare the effectiveness of cryostretching and static stretching on hamstring flexibility in young females.

Methodology: A quasi experimental trial was done, using non probability convenience sampling technique. Thirty young female students from Clinic of Riphah international university having hamstring tightness with at least 10 degree deficiency from 180 degree of Active Knee Extension (AKE) test upon goniometry reading were recruited. Participants were randomly allocated by lottery method into treatment and control group. The leg that showed more tightness considered as treatment leg in both groups. After 5 minutes warm up, pretreatment reading of both groups were noted. Then treatment group received cryostretching technique and control group received static stretching technique as a treatment. After treatment reading was recorded by using AKE Test as a data collection tool and results were analyzed on SPSS 17 version.

Results: The mean age, BMI, Right leg and left leg circumference of treatment group is given respectively 24.00±3.40, 24.42±5.20, 49.06 ±7.05 and 49.06±6.80. Both groups showed improvement in hamstring flexibility, but treatment group show greater increase in flexibility (p=0.00).

Conclusion: It was concluded from result of this study that both cryostretching and static stretching showed increase in the flexibility of hamstring muscle but cryostretching showed greater increase in flexibility of hamstring muscle.

Keywords: Joint flexibility, Muscle stretching exercises, Range of motion, Active knee extension test.

INTRODUCTION

Flexibility is the internal property of the body tissues that is important for normal range of motion across the joints without injury and pain (1-3) and flexibility of musculoskeletal system is important for complete fitness of body and full range of motion without injury at a joint (4). So, decrease in muscular flexibility cause damage to musculoskeletal system and decrease functional level. Mainly damage due to reduction in flexibility occurs in muscles that cross more than one joint and phasic in function (5). Flexibility of the soft tissues including muscles, skin and connective tissue surrounding the joints along with adequate joint mobility are essential for normal range of motion. It has been reported that females have higher incidence of lower limb injuries because stiffness is more prevalent in female than males (6).

Hamstring muscle is two joint muscle with high percentage of fast twitch fibers and it is most frequently damaged muscle in the human body (5, 7). Hamstring is two joint muscle accompanying the hip and knee joint. It is important to have the normal flexibility of hamstring muscles for smooth movement to be occurred at hip and knee joint, because the tightness of hamstrings can be predisposing factor for various problems like Knee pain syndrome, abnormal pelvic tilting in sitting position, disc protrusion or disc bulge, sciatic pain and Spondylolisthesis (8).

Different methods are used for diagnosis of hamstring tightness like popliteal angle, straight leg raise, sacral angle and sit to reach test but active knee extension test has been reported as gold standard test for measuring hamstring tightness (9). Stretching techniques is used as effective technique for hamstring muscle flexibility, because it improves extensibility of muscle thus enhance ROM and prevent injury. Many stretching techniques such as PNF, dynamic stretching, ballistic stretching and static stretching can be used to gain the flexibility (10, 11). Static stretching is most common technique of stretching that is used to enhance flexibility because it is easy to perform and required less time to gain desire results. It enhances muscle extensibility by autogenic inhibition via exciting Golgi tendon organs. In this type of stretching resistance offered to musculotendinous unit is not only due to viscoelastic properties of contractile and non-contractile tissues but also due to neurological reflex. It helps in reducing pain, improving ROM and preventing injury (5).

Cold therapy application for muscle flexibility is widely used therapy but its therapeutic effects can be enhanced if applied with stretching (12). It has been reported that the application of cold prior to stretching results in the inhibition of muscle spindle activity, thus resulted in hamstring relaxation and allowed for a further stretch. It also increases threshold for pain by decreasing conduction velocity and greater improvements in ROM occur either due to neural changes or sensory changes for short term (13).

METHODOLOGY

This study was quasi experimental trial, conducted at clinic of Riphah international university Lahore. The study was completed within the time duration from February 2018 to August 2018. Non-probability Convenience sampling technique was used to collect the data. The sample size of 30 patients was calculated using epitool calculator. Only non-athletic females with age range of 18-30 years with no musculoskeletal injury from last one year and having AKE below 170 degrees were included. Patients were excluded having LBP due to disc problems, lumbar radiculopathy, Osteoporosis and red flags including tumor, fracture, metabolic diseases, RA and prolonged steroid use. Randomization was done through the sealed opaque envelope. Thirty participants were divided into two groups. Group A was treated with warm up, static stretching and cryostretching while Group B was treated with warm up and static stretching. On initial assessment, the demographic details such as age, gender, height, weight, BMI and leg circumference were taken. After that the researcher measured hamstring flexibility through AKE test. According to the inclusion and exclusion criteria individuals with hamstring tightness were included as a participant in the study. They were divided into two groups randomly using the lottery method. After random allocation in groups, all the participants were assessed for limb with less flexibility using AKE test. Limb with less extension ROM upon goniometric measurement was considered as a treatment limb for both A and B groups. All the participants of both A and B performed two sets of eight consecutive repetitions of sit to reach as a warm-up procedure with 3 minutes rest interval between two sets. Five minutes after warm up procedure, all participants performed AKE test and their pretreatment values were recorded. Participants in group A were then treated with Cryostretching applied at treatment leg, checked with active knee extension test. In Cryostretching cold

pack was applied at muscle belly for 14 minutes in prone lying position then static stretching for 30 seconds was performed by physiotherapist passively at treatment leg. Participants of group B were lying in ideal prone position for 14 minutes and then static stretching for 30 seconds of treatment leg was performed. Post treatment assessment was done with the AKE test immediately after treatment. The data was analyzed by using SPSS for Windows software, version 17. Descriptive, independent and paired samples t test was used.

RESULTS

The result of table-I show mean and standard deviation of age of treatment group was 24.00±3.40, Height in meter 1.55±0.04, Weight 59.13±13.12, BMI 24.42±5.20, Right leg circumference 49.06 ±7.05, left leg circumference 49.06±6.80 and control group have mean and standard deviation for age 22.93±2.91, Height in meter 1.526±0.03, Weight 60.40±15.37, BMI 25.78±5.84, Right leg circumference (RLC) 48.16 ±6.43, left leg circumference (LLC) 48.63±6.93.

Table-I: Anthropometric Measurement

Group	Age (Years)	Height (Meters)	Weight (KG)	BMI (Kg/m^2)	RLC (cm)	LLC (cm)
A	24.00 ± 3.40	1.55 ± 0.04	59.13 ± 13.12	24.42 ± 5.20	49.06 ± 7.05	49.06 ± 6.80
B	22.93 ± 2.91	1.52 ± 0.03	60.40 ± 15.37	25.78 ± 5.84	48.16 ± 6.43	48.63 ± 6.93

Table-II shows the pre and post treatment difference of mean across two groups showed improvement in hamstring flexibility of treatment group was greater as compared to control group.

Table-II: AKE deficiency of 180 degree

Group		
	Pre-treatment	Post-treatment
A	28.20 ± 4.34	14.20 ± 3.18
B	27.13 ± 4.17	23.33 ± 4.11
P-value	0.49	0.00

Table-III showed in treatment group the p- value of mean difference of AKE pre-treatment deficiency of 180 degree and post treatment is less than 0.05, so cryostretching increase hamstring flexibility. In control group the p- value of mean difference of AKE pre-treatment deficiency of 180 degree and post treatment is less than 0.05, so static stretching increase hamstring flexibility. Post treatment AKE deficiency was less in both groups that means flexibility of hamstring was improved after treatment in both groups, however flexibility of hamstring improved in treatment group after treatment was greater than control group because post treatment mean difference of treatment group is greater as compared to control group.

Table-III: AKE deficiency of 180 degree

Group				
	Pre-treatment	Post-treatment	Mean difference	P-value
A	28.20 ± 4.34	14.20 ± 3.18	14.00	0.00
B	27.13 ± 4.17	23.33 ± 4.11	3.80	0.00

DISCUSSION

The aim of this study was to compare the effectiveness of cryostretching and static stretching on hamstring flexibility in young female. As cryostretching is novel technique of stretching in which cold pack is applied before stretching thus local cooling immediately decreases sensitivity for stretch and increase flexibility, thus can be used as effective, alternative method when individuals have high stretch sensitivity. This has been proven by previous literature.

Stretching techniques is used as effective technique for hamstring muscle flexibility, because it improves extensibility of muscle thus enhance ROM and prevent injury. It is reported that many stretching techniques such as PNF, dynamic stretching, ballistic stretching ,static stretching can be used to gain the flexibility (14, 15).

Static stretching is most common technique of stretching that is used to enhance flexibility because it is easy to perform and required less time to gain desire results, it enhance muscle extensibility by autogenic inhibition via exciting Golgi tendon organs, in this type of stretching resistance offered to musculotendinous unit is not only due to viscoelastic properties of contractile and non-contractile tissues but also due to neurological reflex. It helps in reducing pain, improving ROM and preventing injury (16). There is still questioning regarding best stretching technique to improve hamstring flexibility.

There is extensive conflict in literature, about which stretching technique have a best result to gain flexibility. Some studies reported that static stretching is more effective when compared with other stretching techniques. D. Scott Davis et al. compared the effect of static stretching with self-stretching and PNF in young healthy population. He concluded from result of his study that static stretching is more effective to enhance hamstring length comparative to self-stretching and PNF (17) . Systematic review done in 2016 to investigate the influence of static stretching on hamstring flexibility in young healthy adults. In conclusion it has been reported that static stretching is an effective to increase hamstring flexibility.

Previously with the best of my knowledge single study was done to compare the effectiveness of cryostretching and static stretching on hamstring flexibility using sit to reach test as measuring tool. Results of that study also showed cryostretching resulted in greater increase in flexibility (18).

Laura C. Decoste et al. (2005) done Systematic review to identify effective hamstring stretching method, he concluded in his results that it is difficult to find out most effective stretching technique to gain flexibility of hamstring muscle (19).

Facts of this study had represented significant outcomes regarding measuring the immediate effect of cryostretching and static stretching on hamstring flexibility. Both techniques were significant to increase flexibility of hamstring muscles. But results of cryostreching showed greater increase in flexibility of hamstring muscle as compared to static stretching.

CONCLUSION

It is concluded from the results of study that both cryostretching and static stretching techniques are effective in increasing hamstring flexibility. However, cryostretching showed greater increase in flexibility of hamstring muscle as compared to static stretching technique.

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