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"A Study to Compare Immediate Effect of Static Stretching and Cyclic Stretching on Hamstring Tightness- An **Interventional Study**"

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Abstract - Procedures of task performance select the subject as per inclusion and exclusion criteria. Making subject understand the process, Consent from taken Perform Static and Cyclic Stretching on the subject. Data documentation will be done with data collection. Analysis, Result, Discussion.

Key Words: Hamstring Tightness, 90°- 90°Straight leg raise test, Static stretching, cyclic stretching.

1. INTRODUCTION

Hamstrings are four group of muscles. Which are located at posterior of thigh, semimembranosus, and biceps femoris long & short head. The hamstring muscle functions are to actively flex the knee and extend the hip as in the motion [1].

1.1 90-90 Straight Leg Raising Test

It is use for the hamstring muscle tightness. The supine patient flexes both hip to90°while the knees are bent. The patient then grasps behind the knee with both hands to stabilize the hip at 90° of flexion. The patient actively extends each knee in turn as much as possible. .The 'normal' range of hip flexion (measured when lying flat on your back and raising the leg straight off the floor - knee straight) permitted by the hamstrings is in the region of 80-90 degrees[1,2]. A range of hip flexion movement which less than 80 degrees are considered **'tight'.** For normal flexibility in the hamstring, knee extension should be within 20°of full extension (Fig. A). Normally, or if the hamstring are tight, the end feel will be muscle stretch. Nerve root symptoms may also result, as this positioning is similar to the slump test done in supine lying instead of sitting [2].

Muscle "tightness" can be results from either an increase in tension from active or passive mechanisms. Actively, muscles can become shorter due to spasm or contraction; passively, muscles can become shortened through postural adaptation or scarring. However, hamstring muscle is the most common muscle that goes into shortens or tightness motion either the individual is living active lifestyle or sedentary lifestyle. It has been proven that hamstring tightness is the main contributing factor which will lead to the risk of pathological conditions of the knee and spine [3,4]. One of the reason is that, tight hamstrings can cause the hips and pelvis to rotate back which leads to flattening the lower back muscle. Hence, back problems occur. Hamstring tightness is often an indicator of muscle weakness elsewhere. Weak and unstable of lower-abdominals and spinal erectors, which are the muscles of the lower back, can force the Hamstring to tighten to find stability during movement [1,3].

Tight hamstrings can also be responsible for postural problems and other back problems such as sacroiliac joint pain, as they will tend to pull the pelvis out of normal position [5].

Hamstring muscle activation is increased while executing activities of daily living such as walking, stair ascent, and stair decent between individuals with and without knee osteoarthritis. Altered muscle activation at the knee may interfere with normal load distribution in the knee and facilitate disease progression [1,6, 7].

Flexibility is defined as "the range of motion available in the joint or a group of joints that is influenced by muscles, tendons, ligaments, and bones"[8]. Flexibility of hamstring has long been a concern of physical therapists and rehabilitation specialists, as well as physical educators and sport coaches. Claims have been

Made that increased flexibility resulting from stretching activities may decrease the incidence of musculoskeletal injuries, minimize and alleviate soreness, and improving athletic performance[8-11].Many clinicians have recommended stretching is for the management of improve flexibility, but few have attempted to prove its effectiveness. Suggested benefits include improved athletic performance and functional gains. In addition; stretching has maintained a time-honored role in health and fitness [1].

1.2 Static stretching

It is a commonly used method of stretching in which soft tissues are elongated just past the point of tissue resistance and then held in the lengthened position with a sustained stretch force over a period of time. Other terms used interchangeably are sustained, maintained, or prolonged stretching. The duration of static stretch is pre-determined prior to stretching or is based on the patient's tolerance and response during the stretching procedure [12].

1.3 Cyclic stretching

A relatively short-duration stretch force that is repeatedly but gradually applied, released, and then reapplied is described as a cyclic (intermittent) stretch. Cyclic stretching, by its very nature, is applied for multiple repetitions (stretch cycles) during a single treatment session. With cyclic stretching the end-range stretch force is applied at a slow velocity, in a controlled manner, and at relatively low intensity. For these reasons, cyclic stretching is not synonymous with ballistic stretching, which is characterized by high-velocity movements [12].The differentiation between cyclic stretching and static stretching based on the duration that each stretch is applied is not clearly defined in the literature. According to some authors, for cyclic stretching each cycle of stretch is held between 5 and 10 seconds. However, investigators in other studies refer to stretching that involves 5- and 10-second stretch cycles as static stretching. There is also no consensus on the optimal number of repetitions of cyclic stretching during a treatment session. Rather, this determination is often based on the patient's response to stretching [12].

2. OBJECTIVES

1. To access the immediate effect of static stretching on hamstring tightness.
1. To access the immediate effect of cyclic stretching on hamstring tightness.
2. To compare the immediate effect of static stretching and cyclic stretching on hamstring tightness.

3. METHOD

After the university research ethical committees have given the approval for the study those who fulfilled the selection criteria were invited to participate in this Interventional study. This study design was Interventional study where the 2 groups (Group A: Cyclic stretching, n=15 and Group B; Static stretching, n=15) of sedentary living subjects underwent one-time stretching. This study was conducted at RK University, Rajkot, Gujarat. Hamstring tightness was determined as 90-90 Straight leg raising test (SLR) for pre-test and post-test using universal goniometer. Inclusion criteria were active SLR test of less than 80 degree, right and left both side hamstring tightness, male & female both sex and age group between 18-25 years. They did not have any history of neurological abnormality, and previous injuries or disorders of the lower back or lower extremities.

3.1 Material

Towel, Pillow, Consent form, Goniometer, Plinth, Pen, Paper

3.2 Procedure

Static stretching: the hip of the volunteer was flexed passively by the examiner up to the maximum flexion point with the knee joint maintaining full extension. Three cycles of 30 seconds were performed with an interval of thirty seconds between cycles [13].

Cyclic stretching: the hip of the volunteer was flexed passively by the examiner up to the maximum flexion point with the knee joint maintaining full extension. Nine cycles of 10 seconds were performed with an interval of ten seconds between cycles.

4. RESULT

Statistical analysis was done by SPSS 20.0 paired sample t test was performed for within group compression, between group compressions was done by unpaired t test. P value was less than 0.05 which suggest that there was significant different within the group. While comparing the between group p value was greater than 0.05 which suggest that there was no significant different between group so null hypothesis is accepted and alternative hypothesis is rejected.

Table 1: Demographic physical characteristic for two groups

Group	Total number	Male	Female
Group A	15	7	8
Group B	15	6	9

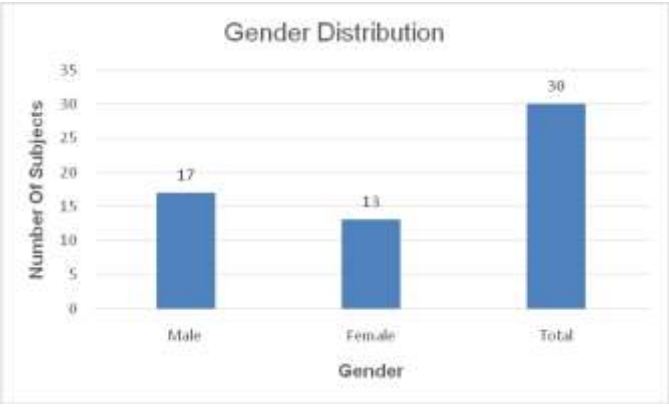

Chart 1: - Demographic physical characteristic for two group

Table 2: Group A; cyclic stretching

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	PRERT	44.93	15	11.708	3.023
	POSTRT	58.87	15	11.407	2.945

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	PRELT	46.60	15	9.701	2.505
	POSTLT	59.87	15	11.357	2.932

Table 2 Showing the data collection scores of 15 subjects from Group A. The data was taken before (Pre-stretching) and after (Post-stretching) one-time cyclic stretching.

Table 3: Group B; static stretching

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	PRERT	44.87	15	11.319	2.923
	POSTRT	58.27	15	11.100	2.866

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	PRELT	44.20	15	11.085	2.862
	POSTLT	57.33	15	10.998	2.840

Table 3 shows the data collection scores of 15 subjects from Group B. The data was taken before (Pre-static stretching) and after (Post-static stretching) one-time static stretching.

Table 4: PAIRED "t" TEST RESULT: Group A; cyclic stretching

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	PRERT - POSTRT	-13.400	2.874	.742	-14.991	-11.809	-18.061	14	.000

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	PRELT POSTLT	-13.267	5.325	1.375	-16.215	-10.318	-9.650	14	.000

Table 4 Showing that there was a significant improvement in the hamstring flexibility after one-time cyclic stretching for right leg of who have hamstring tightness. Here, the t-value of pair-1 right post-test measurement; t-value = -18.061 ($p<0.05$), and t-value of pair-2 left post-test measurement; t-value = -9.650 ($p<0.05$)

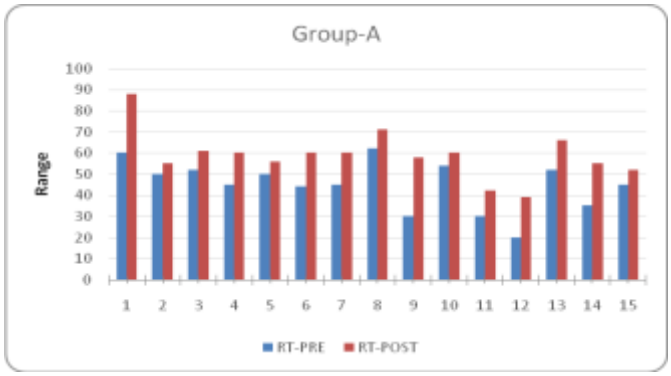

Chart 2: group-A right leg-pre & post

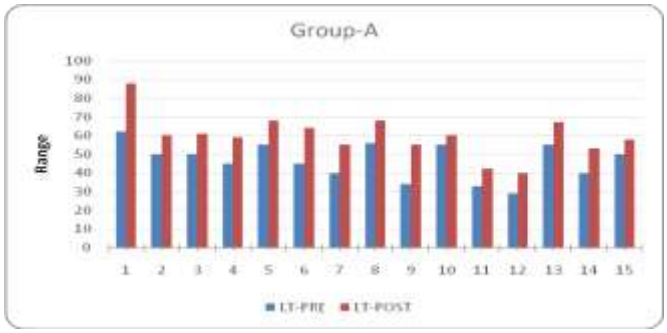

Chart 3: group-A left leg-pre& post

Table 5: PAIRED "t" TEST RESULT: Group B; static stretching

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	PRERT - POSTRT	-13.400	2.874	.742	-14.991	-11.809	-18.061	14	.000

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	PRELT POSTLT	-13.133	3.182	.822	-14.895	-11.371	-15.986	14	.000

Table 5 Showing that there was a significant improvement in the hamstring flexibility after one-time static stretching for right leg of who have hamstring tightness. Here, the t-value of pair-1 right post-test measurement; t-value = -18.061 ($p<0.05$), and t-value of pair-2 left post-test measurement; t-value = -15.986 ($p<0.05$)

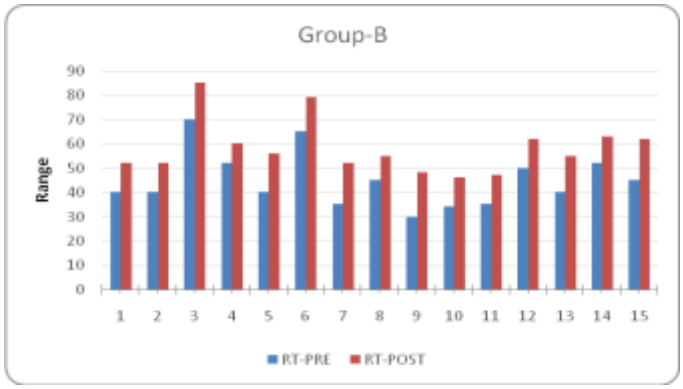

Chart 4 - group-B right leg-pre & post

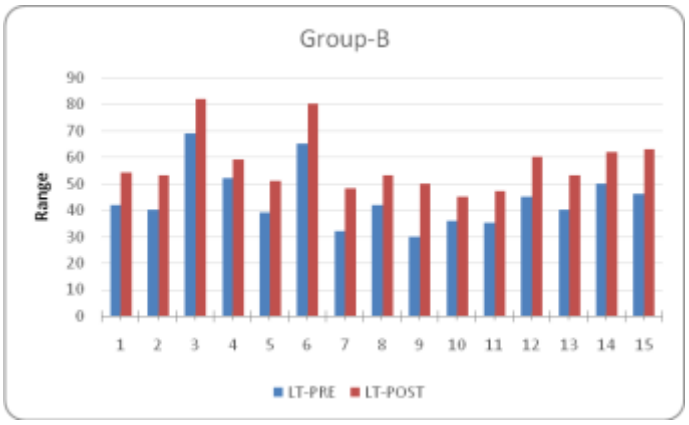

Chart 5 - group-B left leg-pre & post

Table 6: INDEPENDENT‘t’-TEST” comparison for both groups

Group Statistics

	GROUP	N	Mean	Std. Deviation	Std. Error Mean
RT	A	15	13.93	7.421	1.916
	B	15	13.40	2.874	.742

Group Statistics

	Group	N	Mean	Std. Deviation	Std. Error Mean
LT	A	15	13.27	5.325	1.375
	B	15	13.13	3.182	.822

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
RT	Equal variances assumed	8.182	.008	.260	28	.797	.533	2.055	-3.675	4.742
	Equal variances not assumed			.260	18.106	.798	.533	2.055	-3.782	4.848

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
LT	Equal variances assumed	2.003	.168	.083	28	.934	.133	1.602	-3.147	3.414
	Equal variances not assumed			.083	22.867	.934	.133	1.602	-3.181	3.448

Table 6 Shows there was no significant difference(p>0.05) in hamstring muscle flexibility when compared between cyclic Stretching and static Stretching of post-test measurements.

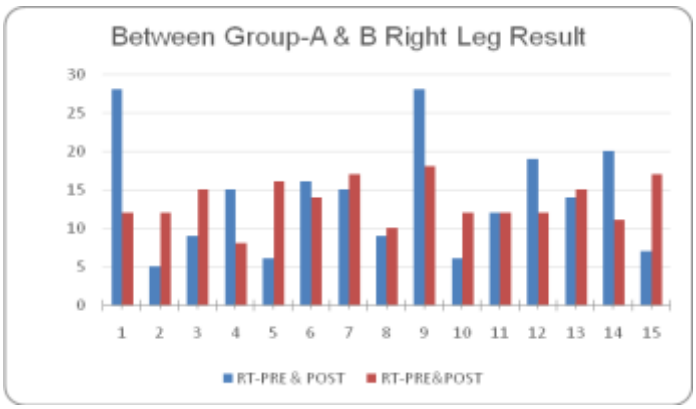

Chart 6: between right leg group A & group B

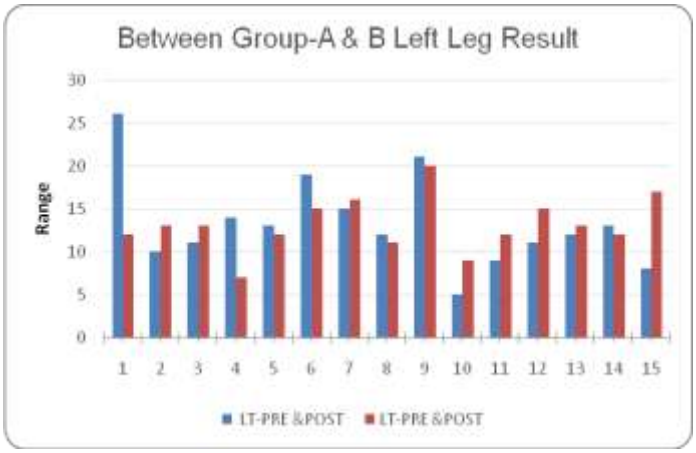

Chart 7: between left leg group A & group B

5. DISCUSSION

Flexibility is an important physiological component of physical fitness, and reduced flexibility can cause inefficiency in the workplace and is also a risk factor for low back pain. Increasing hamstring flexibility was reported to be an effective method for increasing hamstring muscle performance [14]. The results of this study shows that, both the stretching were significantly effective in increasing hamstring flexibility on Immediate post-test measurement and also improving flexibility.

The results of this study suggests that static stretching and cyclic stretching techniques may improve the immediate flexibility gain of the hamstring muscles. The static stretching and cyclics tretching are both equally effective. And better than static stretching which had no any effect on flexibility gain.

The difference between results observed in this study to those reported in literature are due to the performance of stretching protocols that used the onset of pain sensation as reference, whereas in the present study, maximum tolerance to stretching without pain was used. Moreover these differences may also have occurred due to the various protocols used in the studies, variations in positions to perform the muscle stretching techniques.

6. CONCLUSION

The result of this study suggests that static stretching and cyclic stretching techniques may improve the immediate flexibility gain of the hamstring muscles. The static stretching and cyclic stretching are both equally effective. And better than static stretching which had no any effect on flexibility gain.

REFERENCES

[1] Karthikeyan rajendran, llayaraja alagia thiruvevenkadam, arunkumar nedunchechiyan, static stretching vs hold relax (pnf) or sustainability in sedentary living college students,Int J Physiother Res 2016, Vol 4(2):1436-43.ISSN2321-1822: availablefrom;http://dx.doi.org/10.16965/ijpr.2016.113

[2] Dravid j magee, orthopaedic physical assessment, 90- 90 straight nleg raising test: fourth edition, 2006: 634-635

[3] What Causes Hamstring Tightness. 2010; Available from: http://www.livestrong.com/article/228170 what-causes-hamstring-tightness/.

[4] R.L.Morgan Jones, T.Cross, M.J.Cross. Hamstring Injuries. Critical Reviews in Physical and Rehabilitation Medicine, 2000; 12:277-282.

[5] Tight Hamstring Muscles. 2010; Available from: http://www.sportsinjuryclinic.net/sport-injuries/thigh-pain/tight-hamstringmuscles

[6] Tibor Hortobagyi, L. Westerkamp, S. Beam, J. Moody, J. Garry, D. Holbert, & Paul DeV ita. Altered hamstring-quadriceps muscle balance in patients with knee osteoarthritis. Clinical Biomechanics Journal, 2005;20(1):97-104.

[7] Jonathan Labovitz, Jenny Yu, Chul Kim. The Role of Hamstring Tightness in Plantar Fasciitis. SAGE Journal, 2011; 4(6).

[8] Anderson B, Burke ER. Scientific, medical and practical aspects of stretching. Clinical Sports Medicine, 1991;63-86

[9] Liemohn W. Factors related to hamstring strains. Journal of Sports Medicine, 1978; 168-171.

[10] Worrell TW, Perrin DH, Gansneder B, Gieck J. Comparison of isokinetic strength and flexibility measures between hamstring injured and non-injured athletes. Journal of Orthopaedic Sports Physical Therapy, 1991; 13(4):118-125.

[11] Agre JC. Hamstring injuries: proposed etiological factors, prevention and treatment. Journal of Sports Medicine, 1985;2(4):21-33

[12] Carolyn Kisner, Lynn Allen Colby, Therapeutic Exercise: foundation techniques, static stretching and cyclic stretching: fifth edition, 2007: 79-81

[13] Mary Hellen Morcelli1, Jûa Martins Cruz Alves Oliveira2, Marcelo Tavella Navega3 Comparison of static, ballistic and contract-relax stretching in hamstring muscle Morcelli et al. Stretching in hamstring muscle, Fisioter Pesq. 2013;20(3):244-249

[14] Worrell TW, Smith T.L. Winegardner J.Effect of hamstring stretching on hamstring muscle performance. J Orthop Sports Phys Ther, 1994;20(3):154-159.