

Effect of Self - Stretching Exercises on Hamstring Muscles Flexibility using Active Knee Extension in Bharatanatyam Dancers

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Abstract: ***Aim:** This study was designed to know the effects of self - stretching exercises on hamstring muscle flexibility using active knee extension in Bharatanatyam dancers. **Method:** A total of 30 Bharatanatyam dancers were taken. And each subjects hamstring tightness were measured by using active knee extension test, and we trained Bharatanatyam dancers with self stretching exercises protocol for 3 weeks. And after 3 weeks hamstring tightness were measured using active knee extension. **Results:** The study concluded that after 3 weeks of self stretching exercises protocol, hamstring flexibility in Bharatanatyam dancers was increased. **Conclusion:** The results of this study concluded that self - stretching exercises were very useful to improve flexibility in hamstring muscle in Bharatanatyam dancers.*

Keywords: Hamstring muscles flexibility, Self stretching exercises, Active knee extension test, Bharatanatyam dancers

1. Introduction

Bharatanatyam is a classical Indian dance form that traces its roots to the 2nd century and is still one of the most popular and widely practised dance forms in India. This dance form is a beautiful amalgamation of Emotions ('bhava'), rhythm ('taal') and melody ('raag') as accompaniments to the structural physical aspect of the dance^[1].

The basic posture of Bharatanatyam is called 'Araimandi', which involves the dancer to assume a position of half - squat with hips externally rotated and knees flexed. This helps lower the body and Bharatanatyam makes use of this principle to provide the dancer with increased stability. Bharatanatyam dance adds limb movements by outstretching of the arms forward, upward, backward, etc. In some cases when the leg is outstretched as well, in different directions, the base of support also changes. Dance requires these subtle continual changes to ensure the dancer makes quick but smooth, complete moves. Bharatanatyam dance incorporates a lot of one leg positional holds (for poses), spins (single - legged or double), quick movement transitions, changes in positions and stances ('araimandi', 'mandi', 'samam', lunge positions, full sit, side sits etc.)^[2].

In dancers, the hamstring muscle group is used in Bharatanatyam positions as described above. Because of this, the muscles must be warm, strong, and yet, have a sense of flexibility in order for a class or performance to be successful. Dancers are becoming more accustomed to problems with their hamstrings because of improper warm - up techniques, improper class preparedness, lack of information about the Specific muscle group, how to treat them properly, and overuse. Hamstring injuries are common In the world of dance, and they are also common in many sports. With the lack of information, They are also recurrent (O'Sullivan, 2009)^[3].

Injuries to the hamstrings can consist of all three Grades of sprains worsened by overuse. As the hamstring becomes tighter due to insufficient Warming up, cooling down, and correct technique, a dancer could sprain their hamstring and be unable to dance^[4]. Hamstring tightness is not only a causative factor for reduced range of motion but it can also lead to various other musculoskeletal problems^[5]. Tight muscles also compress the blood vessels and lead to reduced optimal performance^[6]. Hamstring strain is one of the most commonly suspected complaints resulting from hamstring tightness^[7]. In many dancers, hamstring flexibility is lost due to age and Lack of proper knowledge on stretching techniques^[4].

Adequate extensibility of the hamstring musculature is also essential for the dancers performance, because there are several dance steps in which a high hamstring extensibility is necessary for proper technical execution (Twitchett, Koutedakis & Wyon, 2009)^[8]. The importance of the hamstring muscles' extensibility in dance lies in the effect they have on the lumbo - pelvic dynamics and the sagittal position of the spine (López - Miñarro, Muyor & Alacid, 2014; McGill, 2002). A high hamstring extensibility allows reaching a maximal trunk flexion position with extended knees (López - Miñarro, Muyor & Alacid, 2014; McGill, 2002),^[9] positions that are repeated frequently during dance training.

Self - stretching sequences are specifically designed to target and stretch the hamstring muscles.

Stretching is an aspect that should not be underestimated. A flexible body is essential to be able to dance: many positions or steps are extremely difficult to perform according to dance standards without the necessary flexibility^[10]. There are different ways to stretch muscles^[11]. The most popular methods to improve flexibility and joint mobility are static

and dynamic stretching, combined with each other without a particular preference for one of the two, especially in relation to anthropometric parameters and age ^[12]. Static stretching is the most popular and widespread in dance. It consists of maintaining a stretching position for at least 30 seconds. According to a previous study, 30 - second duration is an effective amount of time to sustain a hamstring muscle stretch in order to increase range of motion (ROM) ^[12].

Need of the Study

There is lack of research review specifically on Indian classical dancers and in their own context and it acts as a great impediment in providing a scientific recommendation to prevent overuse injuries and offer the right treatment. Since flexibility plays a Pivotal role in the range of performance of a dancer, much need to be studied on this aspect of Indian classical dancers. The traditional practices of the dancers need to be carefully studied and juxtaposed with the modern system of physical training. This study attempts to identify the effects of self Stretching exercises on lower extremity among south Indian bharatanatyam dancers.

Aim

To find out the effect of self stretching exercises on the Hamstring muscle flexibility in Bharatanatyam Dancers

Objective of the Study

To find out the effect of self stretching exercises on the Right and Left Hamstring muscle flexibility by using active knee extension in Bharatanatyam Dancers

2. Materials and Methods

In this experimental study 30 bharatanatyam dancers according to the inclusive and exclusive criteria were included. Active Knee extension is used to analyse the data.

Inclusion criteria:

Bharatnatyam dancers who have been practicing more than 6 months.

Age group consider is 10 - 18 years.

Exclusion criteria:

Recent Foot Injuries

Spinal deformities

Any nerve injuries

Development delay

Sensory ataxia / any sensory disturbances

Hyper mobile joints

Limb Length variations

Subjects who not willing to participate

3. Procedure

A total 45 bharathanatyam dancer were participated in this study, among them 15 were excluded due to various health conditions. Finally, 30 Bharatanatyam dancer Subjects were taken in inclusive criteria. All participants also read and signed an informed consent participating. Selected subjects were participated in pre and post testing with Active Knee Extension test. After pre testing, the participants attended 20 minute training session for participants to learn the self stretching exercises they would be performing. Participants were required to partake in training sessions six out of the seven days of the week with at least one rest day. During the three weeks intervention period, the participants met six times a week for 30 minutes in order to perform their assigned exercises. These intervention sessions were monitored by the researchers to ensure correct execution. The intervention exercises for the participants group utilized the above mentioned exercises in the table. The study concluded with the post test which repeated the same test included in the pre test session.

This three week study was conducted using pre and post testing to know the effect self stretching exercises on hamstring flexibility. The study was performed at Bharathakalakshetram dance institute, and SVIMS, Collage of physiotherapy, Tirupati.

Experimental design and Protocol:

Experimental group performed for 3 weeks of stretching, which consisted of performing a series of movements in a slow and controlled manner, and then increasing frequency and duration.

Specifically, the protocol was composed of:

Exercises.

1) Simple hamstring stretch	start with 5 reps, hold for 30 sec. increase rep by 2X each week
2) Hurdler hamstring stretch	start with 5 reps, hold for 20sec. increase rep by 2X each week
3) Standing hamstring stretch (both legs)	start with 5 reps, hold for 30 sec. increase rep by 2X each week
4) Standing hamstring stretch (one leg)	start with 5 reps, hold for 30 sec. increase rep by 2X each week
5) Towel hamstring stretch	start with 5 reps, hold for 30 sec. increase rep by 2X each week

Result:

Right- Pre Right Hamstring Value 39.87

Post Right Hamstring Value 23.87

Left- Pre Left Hamstring Value.38.17

Post Left Hamstring Value.22.07

Statistical Analysis:

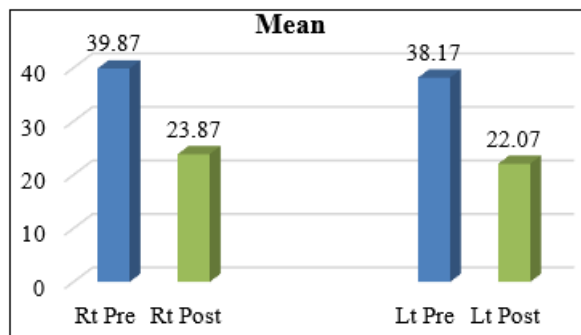
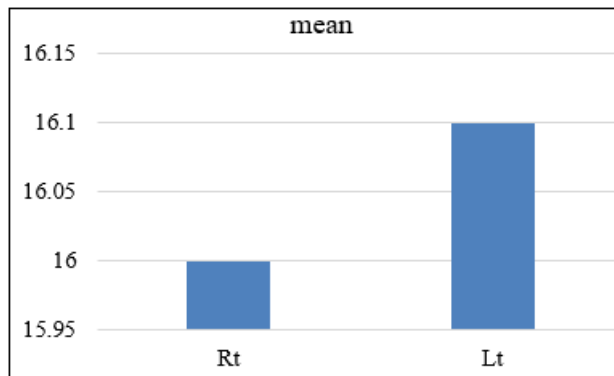
The data from the pre and post - tests were averaged for the analysis

Table 1: Analysis of mean values of pre and post hamstring flexibility of active knee extension using goniometer

		N	Mean	Std. deviation	t value	Sig
Right	Pre Right hamstring	30	39.87	3.579	24.146	0.005
	Post Right hamstring		23.87	3.655		
Left	Pre Left hamstring	30	38.17	3.957	25.504	0.001
	Post LEFT hamstring		22.07	3.532		

Table 2: Analysis of mean difference of pre and post values between right and left hamstring flexibility of active knee extension using goniometer

	N	mean	Std. deviation	T value	Sig.
Pre & Post Right hamstring	30	16.00	±3.629	24.146	0.000
Pre & Post hamstring	30	16.10	±3.458	25.504	0.000

**Figure 1:** Represented that, mean values of pre and post hamstring flexibility of active knee extension using goniometer reflected in table 01**Figure 2:** Represented that, mean difference of pre and post values between right and left hamstring flexibility of active knee extension using goniometer

4. Discussion

Winter et al. stated that passive stretching is more effective than active stretching. Due to Reciprocal inhibition adjusts the contraction of agonist and antagonist muscles to facilitate various movements^[13]. In this study, the reason for difference between active and passive stretching may be the posture of the active stretching group during the stretch. When holding the stretch position the excitatory spinal motor neurons overcome γ inhibitory neuron impulse^[14]. Consequently, there was a simultaneous contraction of agonist and antagonist muscles without antagonist suppression of the γ impulses. In conclusion, passive stretching is more effective than active stretching.

5. Conclusion

In the field of Dance Science, there is a small amount of research dedicated to how strength and flexibility impact dancers' overall muscle health and technique. This research is important to assist dancers, as well as other athletes, to recognize how they can better their muscle health, and how

they can improve in the most beneficial way. During this study, Our participants increased in the flexibility portion of the posttest. Stretchings training significantly improves the flexibility of the hamstring muscles.

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