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EFFECT OF SURYANAMASKAR VS DYNAMIC STRETCHING ON HAMSTRING FLEXIBILITY AMONG PHYSIOTHERAPY STUDENTS: A PILOT STUDY

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ABSTRACT

Background: Physiotherapists are looked upon as role models for practicing a healthy lifestyle. They require a good amount of flexibility and endurance to meet the professional demands. Enhanced flexibility of hamstrings plays a crucial role for physiotherapists to maintain good fitness levels and prevent injuries. Suryanamaskar and dynamic stretching exercises have been proved effective in improving hamstring flexibility in various studies. However, no study proves which technique is better. The objective of this study was to assess the effect of Suryanamaskar and dynamic stretching on Hamstring flexibility and also to compare the effect of suryanamaskar and dynamic stretching on Hamstring flexibility.

Methods: This was a comparative experimental study done on 30 Physiotherapy students. The subjects were selected by the inclusion criteria and were equally divided into two groups. Suryanamaskar and dynamic stretching were given as intervention program for four weeks to group 1 and two respectively. The measurements of active knee extension test and back savers sit and reach test were separately assessed for both the groups pre and post four weeks.

Results: Statistical analysis proved that there was a significant effect in increasing hamstring flexibility bilaterally in both groups with a P value<0.0001. Intergroup comparison showed that suryanamaskar was more effective in improving hamstring flexibility bilaterally with a P value<0.0001.

Conclusion: This study concluded that suryanamaskar was more effective to improve hamstring flexibility compared to dynamic stretching exercises.

Keywords: Physiotherapists, Hamstring muscle, Hamstring flexibility, Suryanamaskar, Dynamic stretching.

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INTRODUCTION

Muscle flexibility is defined as the ability to move a single joint or series of joints smoothly and easily through an unrestricted, pain-free range of motion [1]. Hamstring is a two joint muscle which contracts eccentrically to maintain a proper posture in standing hence are prone to be tight. Hamstrings are an example of muscle groups that tend to shorten (Turner et al., 1988). A tight hamstring causes increased patellofemoral compressive force, which may eventually lead to patellofemoral syndrome (Odunaiya N.A., Hamzatt.K., Ajayi O.F.2005) [2]. Hamstring tightness can also lead to altered gait patterns that are inadequate knee extension at initial contact and overuse injuries. Donald E Hartig (1999) reported that increasing hamstring flexibility decreases lower extremity overuse injuries in basic military trainees [3]. Hence, hamstring flexibility is essential to prevent the injuries associated with it.

Suryanamaskar or salutation to the sun is an ancient method of yogic practice in India. It is a series of 12 physical postures made up of a variety of forward and backward bends which are – Pranamasan, hasta uthanasan, padahastasan, ashwa sanchalasan, parvatasan, ashtanga namaskar, bhujangasan . The series of movement in suryanamaskar stimulates blood circulation to the whole spinal column and brain resulting in a healthy nervous system. Suryanamaskar causes stretching and contraction of the muscles in a systematic manner leading to increased flexibility and strength of muscles [4,5].

The dynamic range of motion(DROM) is defined as a controlled movement through the joint active range of motion while moving but not exceeding individual's extensibility limits (Fletcher & Jones, 2004). According to Murphy, during DROM a contraction of antagonist's muscle causes the joint crossed by the agonist (lengthening muscle) to move through full range of motion(ROM) at a controlled and slow tempo. This contraction by the antagonist causes the lengthened muscle to relax due to the principle of reciprocal inhibition [6].

Physiotherapists play an important role in the healthcare system hence they need to have a good level of physical fitness to meet their job demands. However, this health-related awareness should be inculcated right from the student level. According to a study done in Punjab 2013 which assessed the level of fitness among physiotherapy students, the physical fitness level of physiotherapy students is not satisfactory as compared to the physical demands of the profession. Hence this study emphasizes the hamstring flexibility of physiotherapy students [7].

The objective of this study was to find the effects of suryanamaskar and dynamic stretching on hamstring flexibility and also to compare the effects of suryanamaskar and dynamic stretching on hamstring flexibility in physiotherapy students.

METHODOLOGY

The study was conducted in the research lab of KJ Somaiya College of Physiotherapy, Sion. The subjects were select-

ed from KJ Somaiya College of Physiotherapy, Sion. Thirty subjects with a knee extension range <50 degrees and aged 19 -25years were selected for the study. After taking the written consent of the subjects, they were randomly divided into two groups by lottery method. Subjects having any neuromuscular disorders, cardiovascular disorders, orthopedic conditions of lower limbs and athletes were excluded from the study. The materials used for the study were plinth, goniometer, straps, sit and reach plinth box and measuring tape.

Outcome measures: Active knee extension test and back savers sit and reach test were used to assess hamstring flexibility amongst the subjects. Active knee extension test was performed by subject lying in supine and hip and knee at 90degrees. Knee extension was measured with the universal goniometer. For Back savers sit and reach test, the subject was made to sit at the test apparatus with one leg fully extended such that the sole was flat against the end of the box. The subject bent the other leg so that foot was flat on the floor and 7-10cm to the side of the straight knee. With the leg extended as much as possible, hands on top of each other and palms down, the subject reached forward sliding the hands along the box scale as far as possible. Similarly, the measurements were taken for the other leg [8].

Intervention: Each group comprised of 15 subjects. Group 1 performed suryanamaskar, and group 2 performed dynamic stretching exercises. Both the protocols began with 5 minutes of warm-up (mobility exercise for all joints).

In suryanamaskar protocol, the subjects were well explained about the procedure, and a demonstration of each pose was done. The subjects performed 8 Suryanamaskars in one session. Each Suryanamaskar pose was held for 5 seconds. Hence one cycle of Suryanamaskar lasted for 60 seconds cooldown of 2 minutes followed each session.

In dynamic stretching, the protocol included 1 set of 8 exercises – Straight leg strides, inchworm, walking diagonal lunges, carioca, low lateral shifts, single step Romanian deadlift, backward run, high knee pulls. Each set of exercise lasted for 1 minute (30 seconds for each leg). Hence, the total duration of the dynamic stretch protocol was 8 minutes [9,10]. Each session ended with a cooldown of 2 minutes. The total duration of both the protocols was 15minutes.

STATISTICAL ANALYSIS

Instant graph pad 3 was the software used for statistical analysis. Within the group, the comparison was made with the paired t-test. Intergroup comparison was made by unpaired t-test. P value<0.05 was considered significant for this study. N=30 with a mean age of subjects being 21 years

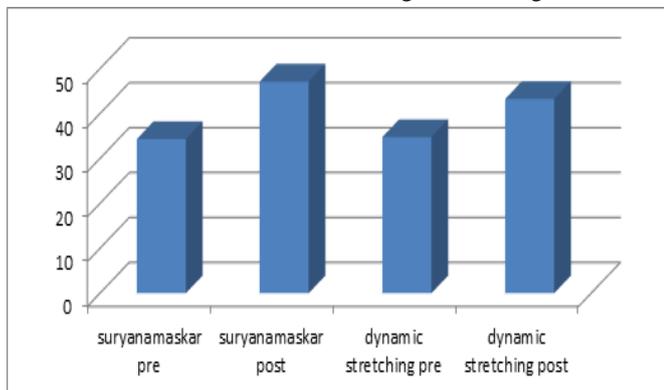
Table 1: Bilateral pre-intervention measurements of both outcome measures for suryanamaskar and dynamic stretching

Protocol	Mean (rt)	Mean (lt)	SD(rt)	SD(lt)	P value
Suryanamaskar AKE	34.33	34.933	5.0237	4.0964	0.7927, Not significant
Dynamic stretching AKE	34.8	35.4	4.601	4.355	
Suryanamaskar BSSR	12.866	13.4	2.5317	2.3844	0.6031, Not significant
Dynamic stretching BSSR	12.4	13	2.3237	2.3196	

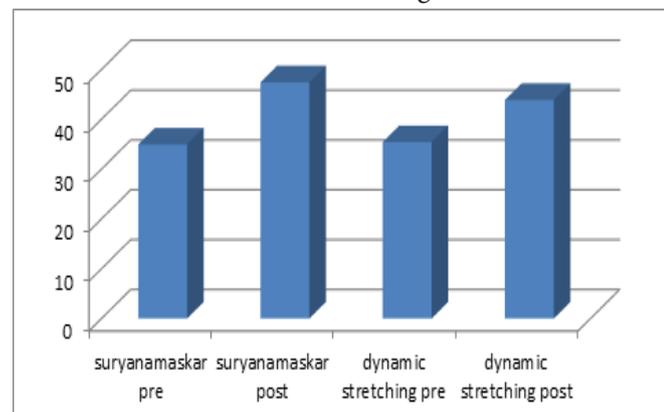
Table 2: Bilateral post-intervention measurements of both outcome measurements for suryanamaskar and dynamic stretching

Protocol	Mean (rt)	Mean (lt)	SD(rt)	SD(lt)	P value
Suryanamaskar AKE	47.133	47.4	5.5788	4.6260	<0.0001 (extremely significant)
Dynamic stretching AKE	43.266	43.866	4.6208	4.4859	
Suryanamaskar BSSR	21.066	20.933	3.0347	2.5485	<0.0001 (extremely significant)
Dynamic stretching BSSR	17.667	18.466	2.3296	2.669	

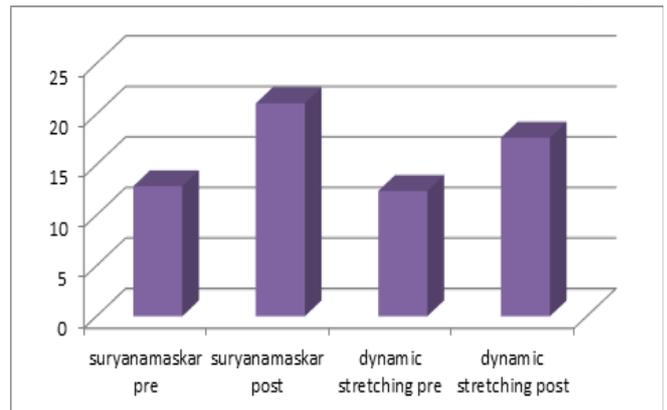
Graph 1: Intergroup comparison for active knee extension test measurements in degrees of right side



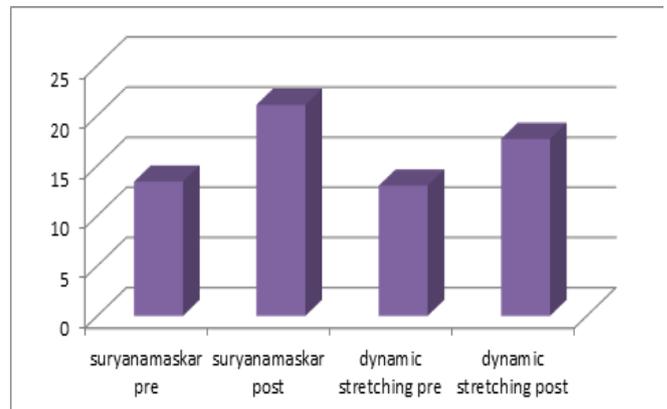
Graph 2: Intergroup comparison for active knee extension test measurements in degrees of left side



Graph 3: Intergroup comparison of back savers sit and reach test measurements in centimeters for the right side



Graph 4: Intergroup comparison of back savers sit and reach test measurements in centimeters for the left side



DISCUSSION

Statistical analysis proves that both suryanamaskar and dynamic stretching are effective in improving hamstring flexibility for both legs with p-value <0.0001. This study also proves that suryanamaskar has a more significant effect in improving hamstring flexibility as compared to dynamic stretching for both legs. Hence, this study accepts the alternate hypothesis.

Hamstrings form a part of the superficial back line. The superficial back line connects and protects the entire posterior surface of the body from the bottom of the foot to the top of the head. When the knees are extended, as in standing, the SBL functions as a continuous line of integrated myofascial. Hence the hamstrings get stretched through the superficial back line when Suryanamaskar is performed [11].

Mastrengho et al. performed a study which concluded that Suryanamaskar has a significant difference in improving hamstring flexibility in menopausal women [12].

A similar study was performed by Kanwaljeet Singh, Dr. Baljinder Singh Bal, Dr. Wilfred Vaz on the effect of Suryanamaskar on muscular endurance and flexibility among intercollegiate yoginis. It proved that Suryanamaskar yoga has a significant effect on improving muscular endurance and hamstring flexibility [13]. A study by Kristine Fondran has also proved that Suryanamaskar improves hamstring flexibility, upper body, muscle endurance and also improves overall mental health [14].

Dynamic stretching works on the principle of reciprocal inhibition. Muscle spindles are stretch receptors within the body of a muscle that primarily detect changes in the length of the muscle. When a muscle spindle is stretched, and the stretch reflex is activated, the opposing muscle group is inhibited to prevent it from working against the resulting contraction of the homonymous muscle. This inhibition is accomplished by the actions of inhibitory interneuron in the spinal cord.

Murphy has theorized that as the dynamic range of motion is performed, metabolic processes increase. A decrease in muscle viscosity is caused by the increased temperature of the muscle allowing a smoother contraction. The flexibility of the muscle improves as it becomes more pliable and accommodating to the forces placed on it due to its elevated temperature [15].

William D. Bandy, lean M. Irion, Michelle Briggler studied the effect of Static Stretch and Dynamic Range of Motion Training on the Flexibility of the Hamstring muscles which concluded that dynamic stretching is effective in increasing hamstring flexibility [16]. Erica Taylor Perrier performed a study which assessed the effect of static and dynamic stretching on reaction time, performance in countermovement jump which concluded that athletes in sports requiring lower extremity power should use dynamic stretching techniques in warm up to enhance hamstring flexibility while improving performance [17].

In suryanamaskar, the superficial front line also gets stretched which causes co-contraction of the superficial back line. Owing to the contraction of the muscles of the back, even the smallest muscles of the spinal column, as well as the muscles of the back, are strengthened whereas dynamic stretching affects only the targeted muscle and joint. Suryanamaskar improves blood circulation in the vertebral region, and consequently, the nerves in this region are invigorated. Along with the hamstrings, the flexibility of the spine is increased and maintained in suryanamaskar [18].

In addition to flexibility, Suryanamaskar has been proved to have positive physiological effects by improving pulmonary function, respiratory pressures, hand grip strength, endurance and resting cardiovascular parameters [19]. These are the possible reasons why suryanamaskar was better as compared to dynamic stretching in this study.

Limitations: The study was performed on a smaller sample size. The subjects were chosen from the same geographic region. Carryover effects of both the techniques were not studied.

CONCLUSION

The study concluded that suryanamaskar, as well as dynamic stretching, are effective in improving hamstring flexibility. It also proved that suryanamaskar is more effective in improving hamstring flexibility as compared to dynamic stretching.

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