



EFFECT OF PADAHASTASANA IN IMPROVING HAMSTRING MUSCLE FLEXIBILITY AMONG YOUNG ADULTS

Physiotherapy

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ABSTRACT

CONTEXT: Hamstring muscle is actively involved in various activities of daily living like walking, stair climbing etc. The flexibility of Hamstring muscle is found to be commonly compromised among various age groups. This may be due to ineffective use of the muscle to full extensibility in routine activities. Padahastanasana is a yogasana in standing position which induces maximum stretch to posterior structures of thigh including Hamstring muscle.

AIMS: This study aims to investigate the effect of Padahastanasana in improving flexibility of Hamstring muscle

SETTINGS AND DESIGN: Experimental Design with random sampling method conducted among 20 subjects.

METHODS AND MATERIAL: Subjects were recruited for the study based on inclusion and exclusion criteria. Hamstring flexibility was assessed using sit and reach box - a standardized tool to measure Hamstring flexibility. The selected subjects were taught the technique of Padahastanasana and practiced for twelve weeks – six times in a day and minimum five days per week. After twelve weeks of practice, hamstring flexibility was assessed using sit and reach box.

STATISTICAL ANALYSIS: Analysis was conducted using 't' test

Results: The study showed significant improvement (t value – 13.01 at $p < 0.05$) in Hamstring muscle flexibility by performing 12 weeks Padahastanasana practice.

CONCLUSIONS: Padahastanasana can be recommended to prevent and treat Hamstring muscle tightness

KEYWORDS

Padahastanasana, Flexibility, Hamstring muscle, Sit and reach test

INTRODUCTION:

The muscles of the back of the thigh particularly, Hamstring has an important role in everyday activities of individuals and athletes. This group of muscles are vulnerable to injuries due to its impact on two major joints of human body while performing multiple missions. They act on the hip joints and knee joints, which are very important in basic movements of gait. Stabilizing role during movement requires very good coordination among these muscles with the synchronized activity of other muscles.

Recent findings show that in the normal young adult population, people spend more time on sleeping, performing sedentary and light activities. Lack of physical activity as well as sedentary life style like spending more time in sitting can increase the risk of chronic diseases, reduce motor firing there by inducing muscle wasting especially, muscles of lower extremity. Eventually, prolonged sitting can also lead to Hamstring tightness^(1,2).

Reduced activation of motor units has been reported in sedentary individuals. Long term consequences of this reduced firing of motor units in sedentary individuals are uncertain. But it is said that Hamstring is one of the muscles expected to be affected by this prolonged sitting in terms of flexibility, strength and endurance⁽³⁾.

Yoga is one of the six orthodox systems of Indian philosophy. The real meaning of Yoga is deliverance from contact with pain and sorrow. Yoga has also been described as wisdom in work or skillful living amongst activities, harmony and moderation⁽⁴⁾. Padahastanasana or the Hand under Foot pose is a 'forward bend asana'. This pose requires considerable amount of flexibility in the back, abdomen, and legs. The term Padahastanasana is a combination of the words pada (the Sanskrit word for 'foot'), hasta (which means 'hand'), and asana (meaning posture). Padahastanasana strengthens the muscles of the limbs as well as the core thereby commonly recommended for people who are interested in overall fitness and muscle flexibility.^(4,5)

Padahastanasana is performed at least 4-6 hours after a meal and preferably in empty stomach. Few preparatory asanas will be helpful to prepare both physically and mentally to perform Padahastanasana such as AdhoMukhaShvvanasana (Downward Facing Dog pose), Paschimottanasana (Seated Forward Bend), Janusirsasana (Head-to-Knee pose), and Supta Padangusthasana (Reclining Hand-to-Big-Toe

pose) before learning Padahastanasana. These prep poses for Padahastanasana are basic yoga poses that will gently stretch and strengthen the muscles of thighs and legs as well as back and abdominal muscles^(3,4,5).

Flexibility is the functional capacity of the joints to move through full range of motion (ROM). Flexibility assessment is necessary because of associated decreased performance of activities of daily living with inadequate flexibility. However, keeping the body flexible can help to decrease tightness and tensions that can lead to chronic and often debilitating physical problems⁽⁶⁾. Poor lower back and hip flexibility may contribute to the development of muscular lower back pain. It is reported that poor flexibility of Hamstring muscle can lead to back pain as it affects correct position of pelvis and lumbar lordosis⁽⁷⁾.

Carving time for yoga or flexibility training with a schedule that is already very busy for whole day, is nearly impossible for most people. Even the most motivated individuals find it challenging to find time to implement any of the worthwhile yoga techniques available to them. In most cases, facilitating mind and body flexibility is easily put aside when it is probably needed the most. Once sidelined from regular activities due to musculoskeletal or other problems, it becomes increasingly difficult to be motivated to start exercise again.

The sit and reach test is the most widely used test for the assessment of flexibility. It does not represent total body flexibility, but it does represent hamstring, hip, and lower back flexibility. It is a valid and reliable test to evaluate flexibility of hamstrings and lower back muscles. Sit and reach test is used to assess low back and hamstring flexibility. The test uses a sit and reach box with a zero point at 26cm⁽⁸⁾.

Need of study:

Hamstring muscle is actively involved in various activities of daily living like walking, running, stair climbing etc. The optimal functioning depends on extensibility and alignment of muscle fibres anatomically. The flexibility of Hamstring muscle is found to be commonly compromised among various age groups. This may be due to ineffective use of the muscle to full extensibility in routine activities. Padahastanasana is a yoga technique which induces stretch on posterior aspect of thigh. Therefore, the present study intends to explore the effect of Padahastanasana on improving Hamstring muscle flexibility. There is a scarcity of research literature on this area which was the

stimulus for undertaking this study. This study will be helpful in understanding the physiological and anatomical effect of Padahastasana on hamstring muscle flexibility.

OBJECTIVE:

To explore the effectiveness of Padahastasana on Hamstring muscle flexibility among young adults in Ernakulam district of Kerala

SUBJECTS AND METHODS:

The present study was designed as experimental research, single group pre – post design. The total sample size was twenty, based on sample size statistical analysis. The subjects were selected based on inclusion and exclusion criteria. Thirty subjects were identified with hamstring tightness who satisfied inclusion and exclusion criteria. Twenty subjects were recruited for present study using random sampling technique through lottery method.

The dependent variable is Hamstring muscle flexibility. Flexibility is the functional capacity of the joints to move through full range of motion (ROM). The independent variable was Padahastasana. Sit and reach test was the outcome measure which was used to assess low back and hamstring flexibility. The test uses a sit and reach box with a zero point at 26cm.

The inclusion criteria were age group between 18 and 25 years, both genders, pre-diagnosed hamstring tightness - females having sit and reach test value less than 24 cm & males having value less than 21cm. The exclusion criteria were subjects who sustained recent fractures, ligament injuries, muscle cramps, recent surgeries, balance disorders etc. Subjects with any deformities and pathological conditions affecting musculoskeletal system and non cooperating persons were excluded from study. Subjects who were undergoing any exercise program were also excluded from the study.

Procedure: Twenty eligible subjects were randomly recruited for the study using lottery method. Information related to study was provided to the subjects and consent was taken. Pre test was conducted to assess Hamstring muscle flexibility using sit and reach box among all twenty subjects. Subjects received Padahastasana training for twelve weeks. The sessions extended for approximately half an hour which included Morning Prayer, loosening exercise, practice of Padahastasana technique up to pre decided repetitions. This was followed by relaxation techniques, closing prayer and wind up. The sessions were conducted for five days – Monday to Friday, for twelve weeks. The subjects were assessed for any discomfort every day. An assessment of Hamstring muscle flexibility was conducted after twelve weeks of training using sit and reach box test.

Technique: Subjects were instructed to stand upright with the feet parallel and heel slightly apart. While inhaling, the hands were raised straight upwards above head, arms touching the ears. Exhaling, the head and trunk bend from waist, maintaining the contact of upper arms with ears. Subjects were instructed to reach forward and catch hold of big toes with the thumbs, index and middle fingers moving forehead to the space between knees. The subjects were instructed to keep the knees straight. Subjects maintained this position for few seconds while holding out the breath.

To release from Padahastasana, subjects were instructed to slide the fingers out from the toes and then straighten out to upright position. The movement is expected to be slow and smooth^(3,4).

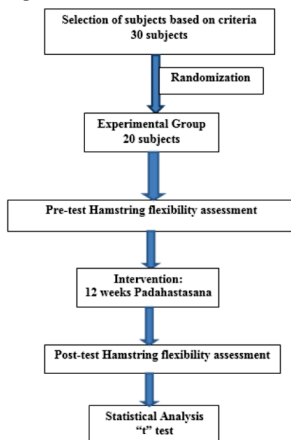


Fig: Flow Chart on Research design

Statistical Analysis:

The data gathered from the study was analyzed with “t” test in SPSS. The mean and standard deviation were calculated. The graphs were plotted and analyzed for the research outcome.

It was found that data was normally distributed and parametric tests were used for pre test – post test comparison. Inferential statistics with independent t test with 95% level of significance (<0.05) assessed the differences due to the effect of 12 weeks Padahastasana practice on Hamstring muscle flexibility. Paired t test was used to assess pre and post test difference among subjects.

RESULTS:

In this study, 20 subjects were recruited to investigate the effect of Padahastasana on Hamstring muscle flexibility. All subjects adhered to the study protocol and also participated in assessment of flexibility at 12 weeks of intervention and no dropout was reported.

Demographic information:

The age, height, weight and Body Mass Index (BMI) of all subjects were evaluated and documented. Mean age was 21.33 years with SD 1.71, mean height was 1.69 meters with SD 0.06, and mean weight was 63.11 kg with SD 10.55 and mean BMI was 21.98 kg/m² with SD 3.55.

The data collected for Hamstring muscle flexibility using sit and reach test from twenty subjects were analyzed with paired “t” test to assess any significant difference.

Table 1: Pre test - post test analysis

Experimental Group	Mean	SD	t value	Significance
	Pre-test	12.33	1.57	14.15
Post-test	17.9	1.55		

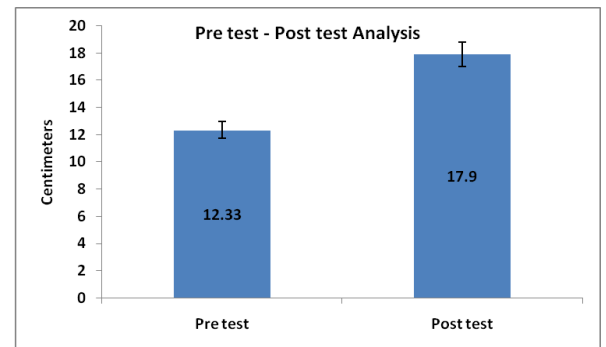


Fig 2: Pre - post test comparison within group

DISCUSSION:

The baseline values of age, body mass index and Hamstring flexibility was found to be normally distributed. Therefore, parametric test was used for pre test – post test comparison. Statistical analysis of comparison of pre test and post test with paired 't' test revealed highly significant difference in Hamstring flexibility among the subjects. This finding positively supports the influence of Padahastasana intervention in improving Hamstring muscle flexibility.

The 't' value was 14.15 which is above the table value at 95% level of significance (p<0.05). Thus, the analysis disclosed that the intervention applied among subjects, ie. Padahastasana, is effective in improving Hamstring muscle flexibility, thus suggesting to accept alternate hypothesis and reject null hypothesis.

Flexibility is an important component of health related physical fitness. Reduced flexibility of Hamstring muscle can adversely affect normal function of the individual and can lead to clinical symptoms like low back pain⁽⁹⁾. Hamstring muscle flexibility is found to be compromised among people with sedentary lifestyle and those who adopt sitting position for prolonged duration. When hip joint moves into flexion, while adopting sitting position, initially the hip flexors relax whilst the extensors, the hamstring muscles, experience an increase in tension. The hamstring muscles run up back of thigh from just below posterior aspect of knee to pelvis. Over an extended period of time, slack Hamstring will shorten to take up slack and eventually tightness of hamstring will develop^(10,11).

The technique applied in this study, Padahastana, includes knee joint extension and hip joint flexion which leads to complete elongation of Hamstring muscle on the posterior aspect of thigh. When Hamstring stretches, it exerts a pull on the pelvis, which causes it to rotate posteriorly. Stretching of Hamstring muscle routinely is required to maintain the extensibility and length of the muscle to ensure optimal functioning. The results of the present study revealed the significant influence of Padahastana on improving Hamstring muscle flexibility. Padahastana technique is performed in slow and rhythmic manner from each position, which would create static stretching on the muscle. The research conducted by Odunaiya et al reported that a 15 second stretch on muscle is sufficient enough to increase flexibility^(9,12).

Recommendations: Padahastana can be recommended as treatment technique for improving Hamstring muscle flexibility. The technique will be useful to prevent Hamstring muscle tightness among healthy individuals.

Future Implications:

Further studies: Research studies can be conducted to explore the effects of Padahastana on musculoskeletal system among various age groups especially geriatric population. Researches need to be directed to investigate the influence of Padahastana in prevention of tightness in lower extremity and back muscles among desktop professionals thereby improving the functional capacities. The effect of regular practice of Padahastana among various professionals who are required to maintain inappropriate postures for prolonged period as a part of professional requirement need to be explored.

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