"EFFECTIVENESS OF JACK-KNIFE STRETCHING ON HAMSTRING FLEXIBILITY IN BHARATNATYAM DANCERS"

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ABSTRACT

- **Background:** Flexibility is considered as an important part of normal biomechanical functioning in dance. Reduced flexibility may lead to produce early muscle fatigue or change the normal biomechanics of movement predisposing to injury. Hence the study aimed to know the effect of Jack Knife Stretching in bharatnatyam dancers in the age group of 18-25 years in Pune city. As dancers have to perform traditional poses, rhythmic foot stamping, jumps, spinning, and positions where the knees are in contact with the floor which is responsible for hamstring muscle tightness in bharatnatyam dancers.
- **Aim:** To study the effect of Jack knife stretching on Hamstring flexibility in bharatnatyam dancers.
- **Material and Methodology:** Permission was taken from institutional ethical committee. 30 dancers of both the genders were assessed using sit and reach test and dancers having hamstring tightness aged 18-25 years ; practicing since 1 and above years were selected. The subjects were assessed for hamstring flexibility with sit and reach test (SRT) subjectively.
- **Results:** Data was analysed and showed that there is increase in the pre value (21.06±3.46) when compared with post assessment (22.96±3.37), shows marked improvement in bharatnatyam dancers.
- **Conclusion:** Our study concludes that Jack Knife stretching has a significant improvement in Hamstring muscle Flexibility in bharatnatyam dancers.

Keywords: (Hamstring tightness, Jack Knife Stretching, SRT)

INTRODUCTION

The hamstring muscle complex consists of of three individual muscles on the posterior aspect of the thigh and plays an important role in human activities ranging from standing to explosive actions. The semitendinosus, semimembranosus, and biceps femoris muscles comprise the hamstring muscle group.[1]

Being an antigravity muscle, it helps in maintaining body posture, holding position of pelvis and performing trunk movements such as rotations or bending in relation to lower extremity.

Bharatanatyam is one of the most sublime and ancient of Indian classical dance form that originated in Tamil Nadu. It consist of traditional poses, rhythmic foot stamping, jumps, spinning, and positions where the knees are in contact with the floor.[2] Aramandi is the most basic position in bharatanatyam. This dancing posture has a closed chain knee flexion.[11] Here knees are flexed and there is abduction and external rotation at hip joints. Muzumandi is another pose where knees are completely bent and body is balanced on toes and heels are upstretched. There are several such positions in bharatanatyam to attain which dancers need optimal muscle strength and adequate motion at the required joints. [2]

Achieving these poses involves adequate range of motion at the joints and so flexibility is considered as an important element of normal biomechanics functioning in dance. This dancing posture has a closed chain knee flexion with hip abduction and external rotation.

Reduced flexibility may lead to produce early muscle fatigue or change the normal biomechanics of movement predisposing to injury. The literature report shows a number of accompanying benefits of flexibility including enhanced athletic performance, reduced injury risk, prevention or reduction of post exercise soreness and improved co-ordination. Some studies have shown that reduced hamstring flexibility is a risk factor for the development of patellar tendinopathy and patellofemoral pain.[4]

A study of musculoskeletal problems in female Bharatnatyam dancers stated knee (48.8%), low back (24%), ankle (12.4%), and the shoulder-neck complex (7.5%) as the most common sites of musculoskeletal pain. Another analysis on Bharatnatyam dancers from two different dance schools also showed the knee to be the body part most prone to injury, followed by the foot, ankle, hip, and shoulder.[2]

Stretching of muscle–tendon complexes take place with bone growth in length with adaptation comprising an increase in the sarcomere number in muscle. In case of an unbalanced increase in the sarcomeres and bone length, there is an increase in muscle tightness.

Jack knife stretch for increasing the hamstring flexibility was tested by Michelle Hamilton . Advantage of this stretch consist of increased blood flow to the lower extremities, relaxation of the tight hamstrings and many more. A comparison study between jack knife stretchimg and PNF stretching states that jack knife stretching shows immediate effect on hamstring tightness as it is closed pack position, PNF stretching is in open pack position which again is one of the influence factor for the result. Hence both the techniques can be clinically used to improve the flexibility and range of motion of the hamstring muscles.[5]

The jack-knife stretch is a beneficial active-static stretching technique to efficiently increase flexibility of tight hamstrings.[3]. This type of stretching uses reciprocal inhibition via contraction of the antagonist muscle. Active stretching is a means of improving muscle flexibility along with improving the function of antagonist muscles. Active stretching involves a number of limb movements through the full motion range to end ranges.[5]

Sit and reach test is a measure tool for assessing hamstring and lower back flexibility. The test consist of a slow and gradual lumbar, thoracic and hip (pelvis) flexion.

MATERIALS AND METHODOLOGY

- STUDY TYPE: Experimental
- SAMPLING METHOD: Random sampling
- SAMPLE SIZE: 30
- STUDY DURATION: 4 weeks
- STUDY SETUP: jalna
- TARGET POPULATION: bharatnatyam dancers in and around jalna

Materials required: Demographic data sheet, measuring tape, mat, consent form.

Inclusion criteria

- Subject between age group 18-25 years.[3]
- Dance experience of 5 years.
- Participants willing to participate.
- Subjects positive on sit and reach test.

Exclusion Criteria

- Dancers who sustained recent fractures, ligament injuries, muscles cramps, recent surgeries, balance disorders, any deformities & pathological conditions affecting musculoskeletal system.
- Other form of dance.
- Undergoing any physiotherapy treatment.

OUTCOME MEARSUES

- Sit and Reach Test

OBJECTIVES:

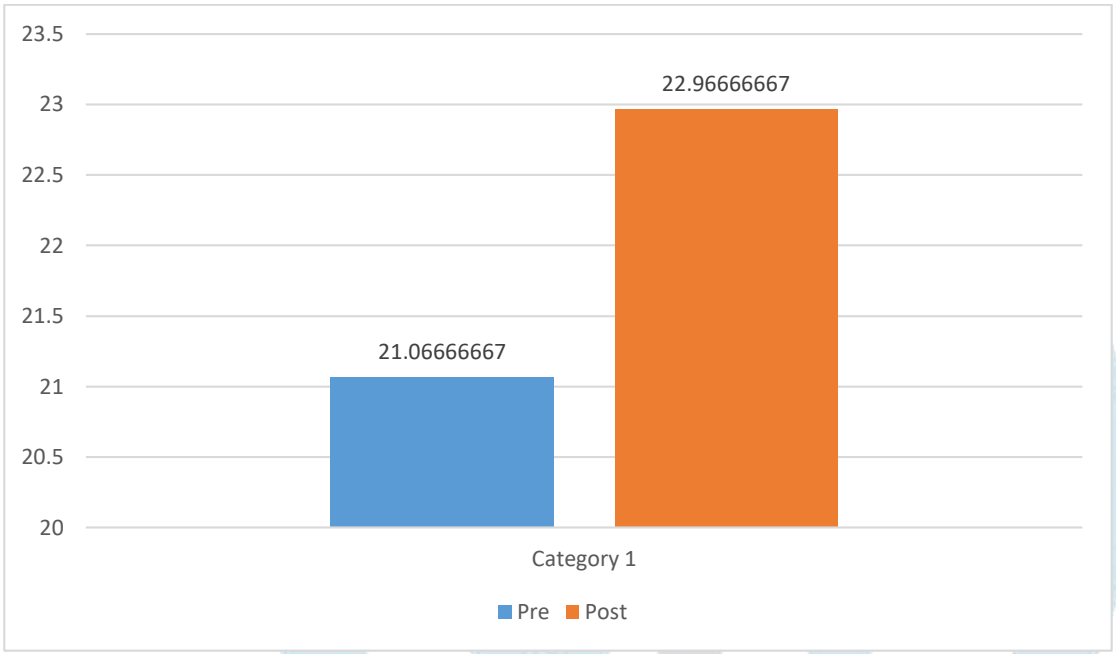
- To assess hamstring muscle flexibility using sit and reach test in bharatnatyam dancers

RESULTS

TABLE NO. 1: Comparison of hamstring flexibility pre and post intervention

PRE	POST	P VALUE
21.06±3.46	22.99±3.37	p<0.0001

GRAPH NO. 1 : Sit and reach test pre and post intervention



Interpretation: : Table no. 1 graph no 1 shows that pre intervention the mean value was (21.06±3.46) and post intervention the mean value was (22.96±3.37) with significant p value 0.001

DISCUSSION

The study was a pre test – post test experimental design to explore the effectiveness of Jack knife Exercise among young adults. The aim of the study was to evaluate the effectiveness of Jack knife stretching on hamstring flexibility in bharatnatyam dancers. Thirty bharatnatyam dancers both males and females within the age group of 18-25 years were recruited for the study.

Table no. 1 and graph no.1 shows the pre assessment and post assessment of sit and reach test. It shows that there is increase in the pre value (21.06±3.46) when compared with post assessment (22.96±3.37), shows marked improvement. Jack knife stretch for improving the hamstring flexibility was tested by Michelle Hamilton. A comparison study between jack knife stretching and PNF stretching states that jack knife stretching shows immediate effect on hamstring tightness as it is closed pack position. It is an active-static stretching technique to efficiently increase flexibility of tight hamstrings. This type of stretching uses reciprocal inhibition via contraction of the antagonist muscle. This active stretching increases muscle flexibility while concomitantly improving the function of antagonist muscles.[9] Stretching of muscle–tendon complexes occurs with bone growth in length with adaptation involving an increase in the sarcomere number in muscle fibers. This stretching technique is based on inhibition of the muscle undergoing stretch, a decreased reflex activity results in reduced resistance to stretch, which results in further gains in joint range

of motion. In biomechanical terms, the muscle-tendon unit is considered to respond viscoelastically during the stretching maneuver.[15]

Another study by Koichi Sairyo to evaluate hamstring tightness before and after the 4-week stretching protocol in healthy volunteer adults and patients aged under 18 years with low back pain before and after the experiment showed the differences were significant ($p < 0.05$) and concluded that the jack-knife stretch is a useful active-static stretching technique to efficiently increase flexibility of tight hamstrings.[7]

In a study by Nakase to study the impact of effective frequency Jack-knife Stretching on Preadolescent Male Football Players (average age: 12.4 ± 0.6 years old) concluded that : Performing jack-knife stretching at least once every 3 days' intervals could improve hamstring exibility in preadolescent male football players.[8]

The results of the study showed that Jack Knife Stretching demonstrated a significant improvement in Hamstring muscle flexibility, as measured by sit and reach test respectively after 4 weeks of intervention. Thus it can be concluded that, Jack Knife Stretching is effective in improving Hamstring flexibility among young bharatnatyam dancers.

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