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Comparative study of dynamic soft tissue mobilization and passive stretching versus passive stretching alone on hamstring tightness of cricket players in order to increase rom

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Abstract
Background: Cricket has gained popularity in our country; INDIA, thus the number of players has also increased. Cricket requires a combination of physical fitness, skill, and strategy. A tight hamstring is one of the causes of Back pain, SIJ, Hamstring muscle strain, PFS, and patellar tendinopathy. The extensibility of the hamstring muscle is important for optimal joint and muscle function. Loss of muscle flexibility as a decrease in the ability of the muscle to deform, resulting in decreased ROM about a joint.
Objectives: To find the effect of Dynamic soft tissue mobilization over conventional therapy in cricket players on improving hamstring flexibility.
Methodology: 30 Players are selected from Ankur cricket academy, Bhopal of 16-26 age group having hamstring muscles tightness. This are equally distributed in two groups A and B of equal size. On group A Dynamic soft tissue mobilization and Passive stretching is applied and on Group B only passive stretching alone.
Result: Independent t test was used to calculate the difference of mean of pre-pre- and post-post Knee ROM between the two groups. The Mean value difference of pre knee ROM of both groups was 31.1±4.24. The Mean value difference of post knee ROM of both groups was 19.33±4.71. Result showed that there was statistically no significant difference in pre-ROM of all the subjects as the p value is >0.05, while there was a significant difference found in post ROM of all the subjects as the p value is <0.05. Later after the comparison of mean values of post ROM of both group, group A showed more improvement than group B.
Conclusions: There was significant increase in active range of motion in both the group's subjects after the protocol. The range of motion gain in group A is higher than group B. Group A received dynamic soft tissue mobilization along with conventional therapy and group B which received conventional flexibility program.

Keywords: Dynamic soft tissue mobilization, Conventional therapy, SIJ, Hamstring muscle strain, PFS, and patellar tendinopathy

Introduction
Cricket is a bat and ball worldwide sport game, including a side of 11 players with batters, bowlers and one wicket keeper. Cricket players are currently playing more cricket each year, with the intensity of these games also appearing to increased [1].
Although a noncontact sport, overuse and impact injuries are common since player go out throughout various activities of physical activities, like running, throwing, batting, bowling, catching, and diving. Injury rates appear to be increasing for cricketers in many countries, with hamstring muscle strain injuries [HSIs] often the most commonly occurring injuries (L516) [2].
The pace bowlers may be at higher risk of HSIs than batters and wicket keepers [3]. The bowler's greater HSIs risk may reflect their greater total running and sprint distances [5] as well as the intense loads placed on the front leg during ball release when bowling, whereby the knee flexors act to quickly decelerate the all-out body's forward momentum resulting from their run-up.

Player position [batsman or bowler] and limb dominance [front or back leg] during batting, bowling and running may therefore have an impact on HSIs chance in cricket. Risk factors that have been associated with HSIs the wider sports medicine literature includes, increased age, previous hamstring muscle injuries, lack of hamstring muscle flexibility, muscle fatigue, and hamstring muscle muscle weakness or asymmetry [8]. Hamstring originate from ischial tuberosity except the biceps femora's (short head) originate from Linea aspera and the lateral condyloid ridge of the posterior femur. Insert at the medial tibial and lateral fibular head. The hamstrings are the string-like ligaments felt on either side of the back of the knee. The hamstrings are a two-joint muscle bulk comprises long head and short head of biceps femora's forming the lateral mass of hamstrings, and the semimembranosus and semitendinosus, making up the medial mass. Hamstring muscle activity during running serves three functions. First, the hamstring muscle work eccentrically to decelerate the forward movement of the foot and leg until the leg swing is halted at a point approximately 30˚ from terminal extension during the late forward swing phase of the running cycle. Hamstring muscle tightness is one of the reasons in drooping the performance in day-to-day activities and different sports activities. Hamstrings tightness makes the knee extension affected in ROM when the hip is flexed. If there is increasing hamstring tightness, the result can be knee flexion contractures, in that case full knee extension could not be possible [14]. Due to reduce flexibility of the hamstring muscle previously had been reported that with the increased risk of damages in musculoskeletal system of adolescent athletes and adults in cross sectional studies [6-9].

Objective of the study

To find the effect of Dynamic soft tissue mobilization over conventional therapy in cricket players on improving hamstring flexibility.

Methodology: 30 Cricket Players are selected through Random Sampling for this study from Ankur Stadium, Bhopal. Study was undertaken for 8 months periods.

Inclusion Criteria: Players was selected on the basis of deficit of 20 degree from full knee extension with hip in 90º flexion, stretch end feel during complete range of motion with the age group of 16-26 years.

Exclusion criteria: Players are excluded those who have muscles injury from last 6 months, Subject with knee extension angle >20˚ with hip joint in 90° flexion. And not fit in the age group.

Procedure: On the basis of Inclusion and exclusion criteria, all players are equally distributed into 2 groups i.e. Group A and Group B.

Dynamic soft tissue mobilization and passive stretch procedure is performed by the therapist in two steps. First DSTM is applied, after assessing the hamstring muscles tightness, the patient was instructed to be lying in prone position, and deep longitudinal strokes was applied to the whole hamstring. once, the localized area of hamstring tightness was found, then the treatment is given to the that localized area to start the procedure of dynamic intervention, the patient had to change its position from prone to supine lying with the knee and hip flexion at 90˚. In this new position, all dynamic techniques worked the hamstring muscle length from third parts of the muscles to end ROM.

Deep longitudinal strokes were applied in a direction of distal to proximal to the localized area of hamstring tightness and then the leg was passively moved to the hamstring lengthened position. Firstly, 5 strokes were applied and 20 seconds of shaking was performed at the end of this technique further checked the localized area whether tightness is reduced or not. If the muscles tightness is reduced then progressive part of dynamic techniques applied again. Or in case muscles tightness not reduced, then this procedure should stop at a time.

In next part of dynamic technique, the leg was actively extended by the patient in order to achieve reciprocal inhibition.

In the final technique, the subjects were required to work the hamstring muscle group eccentrically by creating tension in the therapist's hand as the muscle was elongated to the end ROM. During this movement, the therapist had to performed five deep distal to proximal longitudinal strokes over the reduced hamstring area of muscle tightness for 4 weeks.

After the DSTM, the passive stretching technique was applied on the patient. Where first, patient is instructed to be in supine lying position in relaxed state while maintaining the non-treating limb in straight position on bed, while the treating leg flexed towards the patient chest to stabilize the spine and pelvis. In this position the therapist keep his stop watch on the intervention table or bed to watch the whole timing of procedure.

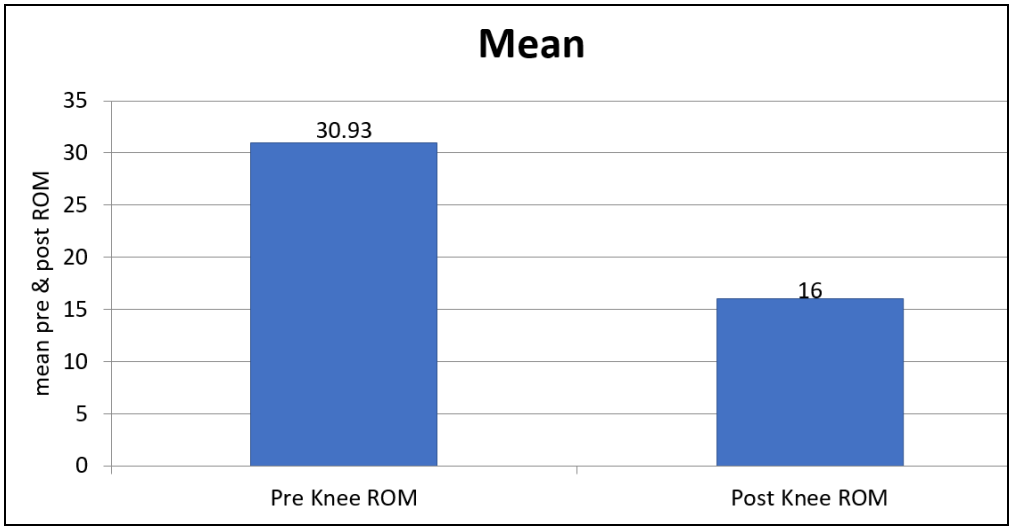
In this position therapist keep posterior side of leg of participants on the therapist shoulder. Then the therapist starts to extend the knee, to provide as much stretching force as possible to hamstring muscle without pain while maintain hip in initial position. This stretch force was applied at the level of subject's tolerance level, for the total 30 second time period, in sets of three cycles of stretches at each intervention, with 10 seconds of rest interval between each set. The force was applied in a manner so for first 15 second the continuous stretch force with same load was maintained, while the stretch force was increase in next 15 second of each set, as the patient perception of stretch reduced during later period of stretching, so this adjustment was done to maintain the maximum stretching force during most of the stretching period which last for 30 seconds.

Data analysis

Table 3: Comparison of mean values of Pre knee ROM & Post knee ROM of Group B

Group B	Mean	SD	T value	P Value
Pre knee ROM	31.26	3.89	18.45	0.001
Post knee ROM	22.66	4.32		

The mean of pre knee rom amongst players of Group B was 31.26±3.89 and that after 4 weeks, Post Knee ROM was 22.66±4.32. Paired t-test was applied and the result is found with statistically significant difference ($p < 0.05$) in pre knee ROM and post knee ROM of Group B



Graph 2: Showing the mean changes in Pre knee rom & Post knee rom of Group

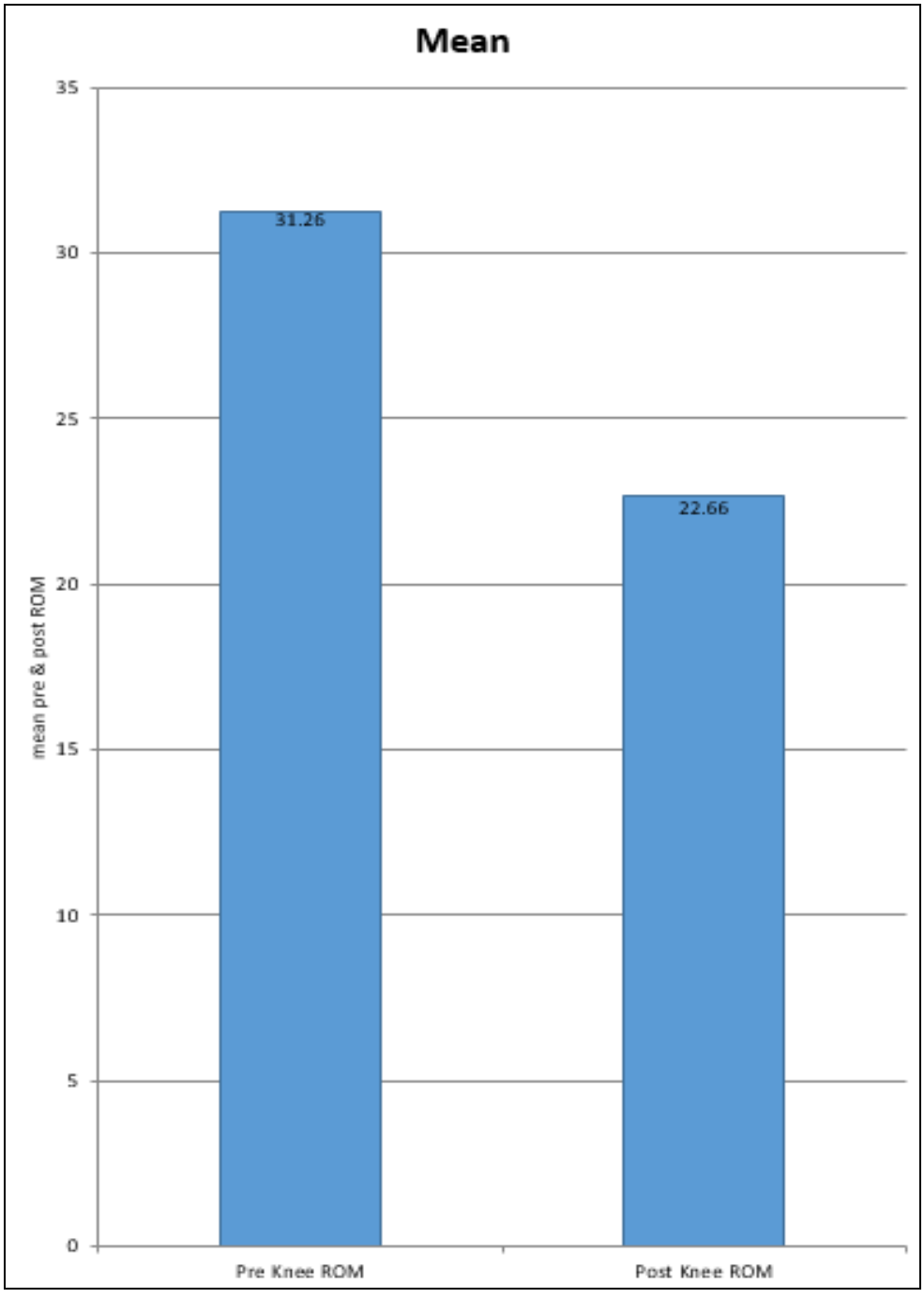
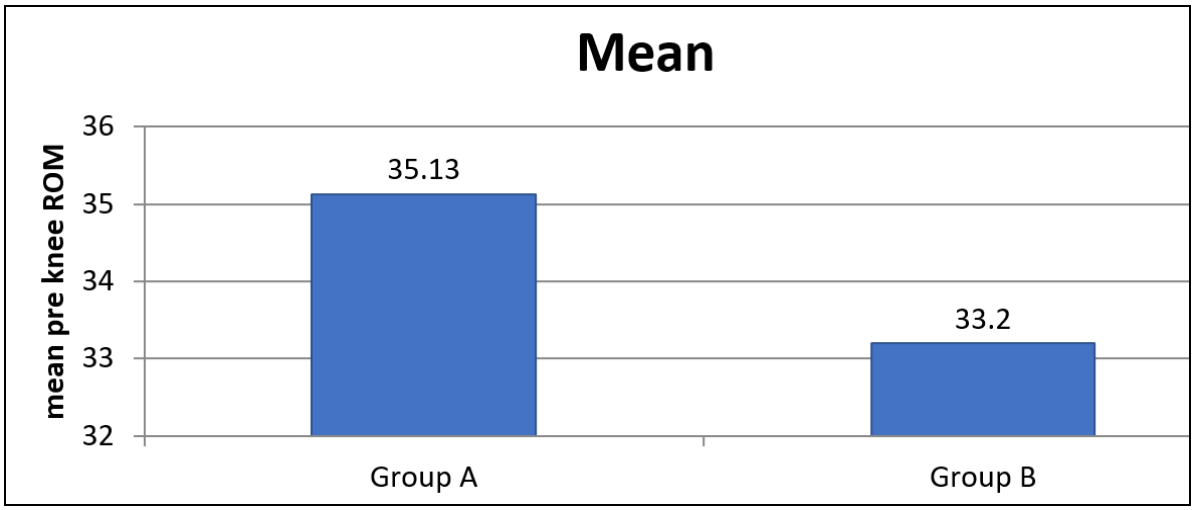


Fig 3: Graph3 showing the mean changes in Pre knee ROM & Post knee ROM of Group B

Table 4: Comparison of mean values of Pre-Pre-Post Post Knee ROM between Group A & Group B

Groups	N	Mean	SD	T - Value	P Value
Pre rom	30	31.1	4.24	-0.214	0.832
Post rom	30	19.33	4.71	-3.857	0.001

Independent t test was used to calculate the difference of mean of pre-pre- and post-post Knee ROM between the two groups. The Mean value difference of pre knee ROM of both groups was 31.1±4.24. The Mean value difference of post knee ROM of both groups was 19.33±4.71. Result showed that there was statistically no significant difference in pre ROM of all the subjects as the p value is >0.05, while there was a significant difference found in post ROM of all the subjects as the p value is <0.05. Later after the comparison of mean values of post ROM of both group, group A showed more improvement than group B.



Graph: Group showing that the mean changes in Pre-Pre ROM & Post-Post ROM of Group A & Group B

Result

The obtained data was statistically analyzed using paired and unpaired t-test. Pre -treatment mean and SD value of Group A and B was 31.1±4.24 and post treatment mean and SD value of group A & B was 19.33±4.71. Pre-treatment mean and SD value of Group A was 30.93±4.58 and Post treatment mean and SD value of Group A was 16.00±5.11. Pre-treatment mean and SD value of Group B was 31.26±3.89 and Post treatment mean and SD value of Group B was 22.66±4.32. There was significant increase in active range of motion in both the group's subjects after the protocol. The range of motion gain in group A is higher than Group B, Group A received dynamic soft tissue mobilization along with conventional therapy and group B which received conventional flexibility program.

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