

# Comparative Effect of Static Stretching and Mulligan Stretching on Hip Adductor Flexibility in Footballers - A Two Group Trial

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## Abstract

Groin pain due to adductor strain is commonly seen in footballers. Many methods of stretching a muscle like ballistic stretching, static stretching etc are used to increase flexibility of hip adductors and prevent groin strain. Static hip adductor stretching till now is more favored technique whereas mulligan adductor stretching is very new and popular method of increasing muscle flexibility. The present study was undertaken to compare the effectiveness of 2 stretching programs i.e. Mulligan adductor stretching and static stretching on tight hip adductor. In this trial, 42 athletes who fulfilled the selection criteria were selected and then divided into two groups based on block randomization. Group-1 received Mulligan's adductor stretching while Group-2 received static stretching of hip adductors for 3 alternative days. Hip abduction range of motion (Abd-ROM) was measured on baseline, after first day treatment and finally after third day treatment by a universal goniometer. Mean difference of Abd-ROM within groups on baseline, 1<sup>st</sup> day after treatment and 3<sup>rd</sup> day after treatment were -8.07, -12.76, -4.69 which shows highly significant difference ( $p = 0.00$ ) between 3 sessions. Mean Abd-ROM between two groups has not shown significant different ( $F = 2.99, p > 0.05$ ). It is concluded that Mulligan's adductor stretching and static stretching both are equally effective in increasing Abd-ROM.

## Key Words

Groin pain, Mulligan stretch, Adductor tightness, Static stretch, Hip abduction range of motion

## Introduction

Stretching is a technique in which muscles are lengthened in order to increase its elasticity and prevent tightness. It stimulates muscle growth (1,2). In stretching force is applied independent of any voluntary movement of tissue (3). Groin pain due to adductor strain is commonly seen in footballers. It can lead to degenerative arthropathy of pubic symphysis in an advanced stage. Groin strains are very commonly seen in sports like football especially if the player has history of previous hip adductor injury, decreased Abd-ROM and hip adductor to abductor strength imbalance which leads to decreased performance (4). 5% to 18% of all injuries in footballers were localized in the groin region according to a study (5).

Sports injuries can be prevented by physical

preparation prior to play. The physical training improves the physical function of a footballer as well as protects him against injury. There are many methods of stretching a muscle like ballistic stretching, static stretching, and proprioceptive neuromuscular facilitation techniques (6). All these methods increase ROM after stretching (7).

Static stretching is more favored technique than ballistic stretching as it is very simple to execute and causes less tissue trauma (7). Mulligan stretching technique is however very new and a popular method of increasing muscle flexibility. It has an additional component of manual traction along with stretching. Manual hip traction temporarily decreases compression on the cartilage and moves fluid within a joint which can be an add-on factor for increasing ROM and decreasing pain (8). Traction

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also exerts an inhibitory influence on alpha motor neuron activity of lower limb (9). Not much information is present in literature about this method of stretching, therefore the purpose of this study is to examine the effects of mulligan technique vis static stretching technique on adductor muscle flexibility.

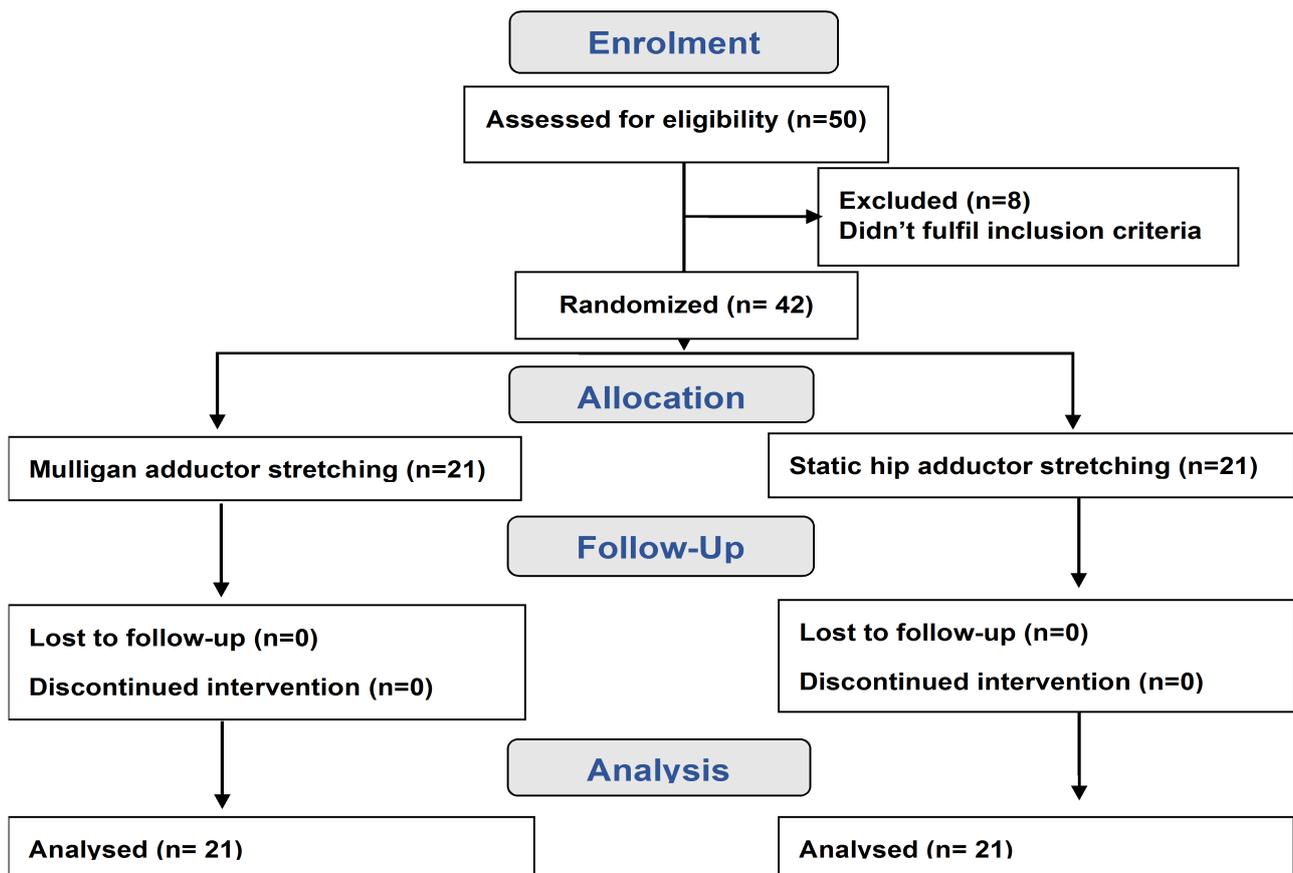
**Material and Methods**

This study was experimental in nature done on forty-two male footballers by randomly dividing them in two groups of 21 each. Fifty national and state level footballers were included in the study. Forty-two of them fulfilled the inclusion criteria and eight were excluded. No drop outs were observed from any of the group during the study (*Figure 1*). Subjects were taken from the Sports Authority of India (SAI) Cuttack, Odisha. Data was collected in gym area of SAI. Inclusion Criteria was Abd-ROM 35°- 40°, not undergoing any hip adductor stretching program and age between 15-40 years. Subjects who had bone, joint or muscle problems that could limit stretching, any recent surgery of lower limb or any

deformity of lower limb were excluded. The trial is registered with the Clinical Trials Registry, India (CTRI). Ethical approval was obtained from the Srinivas College of Physiotherapy and Research Centre, Mangalore, Karnataka.

At the first visit, athletes were made to fill the consent form and pre participation questionnaire. Those who all fitted in inclusion criteria were selected. Athletes were randomized into two groups. Mulligan’s Adductor stretching was given to group 1 and Static Adductor stretching to group 2. Techniques were applied on athletes for three alternative days. Abd-ROM was measured before first session, after second session and after the last session.

Researcher one (SP) was blinded to group allocations. He took the outcome measurement prior to and after the treatment. Researcher two (SB) performed the stretching procedures (either static stretching or mulligan stretching). For Mulligan’s Adductor stretching, patient was lying in supine position and pelvis was stabilized with the help of a belt, knees bent and on sides of couch.



**Figure 1: Consort Flow Diagram of The Study in Terms of Enrolment, Allocation, Follow Up and Analysis**

Lower thigh was grasped using mulligan belt in a figure of 8 pattern, followed by traction and hip abduction till available end range. A hold of 15 sec was given and then again traction and stretch till new range was achieved. It was repeated thrice in a session (10). Pelvis was stabilized throughout the session. Static stretching was also given in same position. For this therapist kept one hand on medial side of knee and other on medial side of foot. Then subject's leg was abducted till maximum available Abd-ROM was achieved. It was held for 30 sec. Four sets with two repetitions in each set with 30s interval were given (11).

Abd-ROM was measured pre and post intervention using standard 360° goniometer (12,13). Position of the subjects was supine lying, pelvis stabilized with help of mobilization belt. Imaginary line between two anterior superior iliac spine (ASIS) was used for alignment of the stationary arm of the goniometer. Centre for the fulcrum of the goniometer was kept at unilateral ASIS and the moveable arm of the goniometer was aligned over the midline of the femur. The contra lateral leg was kept down on the edge of the couch while patient performed hip abduction (12). Measurements were taken on 1st day

pre and post session and end of 3rd session (on the 5th day).

The values of all the parameters of the sessions of pre-treatment, post-treatment day-1 and post treatment day-3 were recorded and compared for intra group analysis and inter group analysis. Sample size was calculated based on the need of minimal clinical difference with the level of significance assumed less than 5% and keeping the power 80%. Mean, standard deviation and standard error were calculated for the purpose of summarizing the data and analysis. Repeat measures ANOVA was done to know the overall effect of treatment protocols on the parameter between the two groups and between the three-time measurements in each group. The *p* level was kept as 0.05 and less than that level was considered as significant. Analysis was done using the SPSS version 16.

### Results

Observations and results of the study are shown in Table 1-3. Highly significant difference was found in both the groups between 1st, second and third session. The mean difference for the pair wise comparison

**Table 1: Descriptive Statistics for Baseline Characteristics of the Subjects**

Characteristics	Group	Mean	SD	Maximum	Minimum
Age (Years)	1	23.6	5.66	17.00	31.00
	2	23.57	5.77	16.00	31.00
Height (Meters)	1	1.69	4.40	162.00	178.50
	2	1.68	4.37	162.00	177.00
Weight (Kgs)	1	62.19	3.69	56.00	70.00
	2	61.19	6.25	49.00	73.00
Play Experience (Years)	1	7.19	2.76	4.00	16.00
	2	8.19	4.36	4.00	22.00

**Table 2: Descriptive Statistics for Hip Abduction ROM of the Subjects on Three Occasions in both Experimental and Control group (n=21)**

Point of Measurement (Abd-ROM)	Group 1	Group 2
Base line	32-85 ± 4.66	34.71 ± 4.37
Pre test	43.33 ± 4.74	40.38 ± 4.34
post test	49.38 ± 4.42	43.71 ± 3.56

**Table 3: Overall Intertime (Pair-wise) Comparison of Change in Hip Abduction ROM**

S. No.	Time Pairs	Mean Difference	Standard Error	F	P level	95% CI	
						Lower bound	Upper bound
1	0 v 1	-8.07	.28	81.16	0.00	-8.78	-7.35
2	0 v 2	-12.76	.35		0.00	-13.65	-11.86
3	1 v 2	-4.69	.24		0.00	-5.29	-4.08

between the times of measurement such as Time 0 v 1, 0 v 2, 1 v 2 were  $-8.07 \pm 0.28$ ,  $-12.76 \pm 0.35$ ,  $-4.69 \pm 0.24$  respectively with the F value = 81.16 ( $p = 0.000$ ). The difference between two groups was not significant ( $p > 0.05$ ) i.e.  $p = 0.09$ ; F value was 2.99.

## Discussion

Flexibility is considered as an important aspect of physical fitness and normal biomechanical functioning in sports. This is often evaluated from the joint range of motion (ROM) (14,15). Increased muscle tightness and lower extremity injury go hand in hand in general. With muscle tightness tropocollagen cross linking increases which leads to decreased collagen solubility which in turn leads to tendon rigidity (16).

This study was done with the aim to compare the effectiveness of the mulligan adductor stretching with static hip adductor stretching. Immediately after the treatment, on the 1st day there was a significant improvement in the abduction ROM found in both stretching groups in this study. Many studies have indicated that static stretching method can induce an acute increase in flexibility. It also improves pain tolerance (17,18,19). Bruce *et al.* in their study concluded that there was significant improvement of hip flexion and shoulder extension ROM in all the groups using three stretching techniques (static stretching, contract-relax, contract-relax with agonist-contraction) (20). Stretching exercises increase the movement capacity of a muscle by decreasing the viscosity of the tendinous structures and manual traction along with it further increases flexibility by stretching numerous articular and peri-articular soft tissues around hip joint. This also must be reason for the increase in abduction ROM in Mulligan's stretching. Manual hip traction also temporarily decreases compression on the cartilage and moves fluid within a joint which can be a add on factor for increasing ROM and decreasing pain (8). At the same time, stretching exercises generate an increase in muscle compliance that may limit more cross-bridge coupling, thus decreasing the capacity of the muscle to produce force (21,22). This would be the cause for the increase in the flexibility in both the groups in this study.

Thus, even after second and third session treatment results showed highly significant improvement in abduction ROM ( $p = 0.00$ ) in both the groups. All participants in this study, exhibited a statistically significant change in passive hip abduction during each treatment visit. This lends support for the immediate benefits of manual traction

aided Mulligan stretching for hip adductor tightness. Also, both the groups did not have any marked soreness in the adductors. The mean Abd-ROM between two groups had not shown significant difference ( $F = 2.99$ ,  $p > 0.05$ ). Thus, both static and Mulligan stretching produced the similar effect.

This study suggests that well controlled stretches like static and Mulligan's stretching may result in decreased passive tension in a muscle at neutral length, concluding that both types of stretching techniques are effective for increasing flexibility of hip adductors. Thus, the hypothesis that different effects would be induced by these methods was not verified.

This study has its own limitations in terms of having small sample size. Furthermore, the follow up was not long due to less time frame and availability issues of the subjects. Stretch tolerance factor was not considered. Subjective response was not taken. A patient-directed functional outcome measure was not included as well as long term effects of treatment were not seen in this study.

## Conclusion

Both mulligan's adductor stretching and static stretching of hip adductors proved good and equally effective in the improvement of hip adductor flexibility in footballers. Effect of both techniques need to be studied in injured players. Future studies with larger sample size, patient focused outcome measure, longer follow up of subjects can be done to improve scope of practice.

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