RAJIV GANDHI UNIVERSITY OF HEALTH SCIENCES

BANGALORE KARNATAKA

ANNEXURE II

PROFORMA FOR REGISTRATION OF SUBJECT FOR DISSERTATION

1	NAME OF THE CANDIDATE & ADDRESS	AMRITA MISHRA C-582, Second Floor, lane no.-7,Majlish Park, Delhi-110033
2	NAME OF THE INSTITUTION	KRUPANIDHI COLLEGE OF PHYSIOTHERAPY
3	COURSE OF STUDY AND SUBJECT	MASTER OF PHYSIOTHERAPY IN MUSCULOSKELETAL AND SPORTS
4	DATE OF ADMISSION TO COURSE	06.06.2019
5	TITLE OF TOPIC : COMPARISON OF PROPRIOCEPTIVE NEURO-MUSCULAR FACILITATION AND MULLIGAN STRETCHING ON HAMSTRING TIGHTNESS IN RECREATIONAL FOOTBALL PLAYERS.	

6	**Brief Resume of the intended work**

Introduction

Muscles ability to lengthen , allowing a joint to move throughout the range is known as muscle flexibility[1].Flexibility is one of the standard components for the prevention of injuries and for rehabilitation as well[2].Clinicians and sports medicine specialists routinely survey hamstring tightness (i.e., hamstring flexibility) since short hamstring have been identified with various lower limb injuries[2].

During the previous years in India, football among numerous youngsters has promoted as a recreational sport. As football is a game that includes extraordinary physical quality, such adolescents, who are not under experts guidance are at the risk of getting exposed to musculoskeletal injuries because of lack of appropriate warm-up and stretching's[3].

High intensity sprinting is an important component for scoring a goal in football game[4].
while looking for athletes overall physical fitness, hamstring flexibility is one of the greatest concern which has a significant impact on athletes performance due to hamstring injuries[5].

There has been a great importance of muscle stretching for prevention of injuries, as well as skill development and physical capacity[1].There are various stretching techniques for the muscle such as static stretching, ballistic stretching, and proprioceptive neuromuscular facilitation (PNF) stretching[1].

PNF techniques are more effective than the traditional stretching techniques for flexibility enhancement[6].Mulligan traction straight leg raise is a technique for muscle stretching to increase the limited hip flexion range of motion which is limited due to hamstring shortening[7].

6.1 Need of the study

Prevalence of hamstring tightness is present significantly at higher rates among athletes engaged with contact sports[8].

Due to the hamstring tightness the performance in the game is affected.

Proprioceptive neuromuscular facilitation is been proved more effective than static stretching in football players[1].

TSLR Mulligan stretch is better than BLR Mulligan stretch in improving the biceps femoris muscle performance, flexibility[9].

Young football players with great hamstring flexibility will have better performance in tests of sprinting[2].

Though there are studies available but there is a dearth in studies comparing the effects of PNF and mulligan TSLR stretching among the Amateur football players and that is where the need arises to compare the effects of PNF and mulligan TSLR stretching among the College Level football players.

6.2A. Aim and Objectives of the study

Aim of the study :

To evaluate the effectiveness of proprioceptive neuromuscular facilitation and mulligan stretching on hamstring tightness in recreational football players.

Objectives of the study :

1) To evaluate PNF stretching on sprint, agility and flexibility performance on Recreational football players.
2) To evaluate Mulligan stretching on sprint, agility and flexibility performance on Recreational football players.
3) To compare the effect of PNF and Mulligan stretching on sprint, agility and flexibility among the Recreational football players.

6.2B. Hypothesis

Null Hypothesis (H0):

There is no significant difference among PNF and Mulligan stretching on sprint, agility and flexibility among the Recreational football players.

Alternate Hypothesis (H1):

There is significant difference between the PNF and Mulligan stretching on sprint, agility and flexibility among the Recreational football players.

6.3. Review of Literature

1) T Burgess , et al.

States that Contract-Relax Agonist-contract(CRAC), when applied to stretch the hamstring muscles of active males, resulted in a large increase of active knee extension range of motion, without decreasing performance. Therefore, CRAC appears to be a safe and effective method of increasing the length of the hamstrings pre-sport activity and should be utilized by sports physiotherapists if deemed necessary. It was also shown to be beneficial following the initial assessment[10].

2) Laura Deguzman et al.

Concluded the PNF intervention elicited a greater improvement in knee extension angle compared to the foam rolling intervention. but not when compared to the dynamic warm-up intervention[11].

3) Landon Lempke, et al.

Stated that PNF stretching was not demonstrated to be more effective at increasing hamstring extensibility compared to static stretching. The literature reviewed suggests both are effective methods for increasing hip-flexion ROM[12].

4) **Ramachandran. S, et al.**

Conducted a study to find the effectiveness of two PNF stretching techniques (Hold Relax and Contract Relax-Antagonist Contract) on improving hamstring flexibility concluded that both PNF hold relax and PNF contract relax antagonist contract stretching is effective in improving hamstring flexibility. However PNF contract relax antagonist contract stretching technique was better than PNF hold relax stretching technique in improving the hamstring muscle flexibility[13].

5) Erick D. Richman et al.

designed to determine the effect of a 6-minute protocol of self massage known as self-myofascial release(SMR) using a foam rolling device in conjunction with a general warm-up and sport-specific dynamic stretching (DS)session on flexibility and explosive athletic performance stated that self-myofascial release in the form of foam rolling after a general warm-up and preceding a dynamic stretching session seems to improve squat jump and countermovement jump with no detriment to flexibility, drop jump, sprint, and agility performance in comparison with light walking and dynamic stretching[14].

6) Wootaek Lim

Investigated changes in hamstring flexibility in relation to intensity of proprioceptive neuromuscular facilitation stretching and changes in pain over time, and examine the correlations between pain level and target intensity or flexibility gain concluded that Repetitive high intensity stretching may cause heavy burden on muscle tissues, and pain

caused by high-intensity stretching can hinder muscle performance. Moderate stretching intensity is recommended and considered conducive to maintaining the effects of stretching while ensuring its safety[15].

7) Robin KV, Dr. YC Louis Raj

Revealed that a single session of PNF stretching on hamstring muscle is an effective and suitable method to improve the flexibility of hamstring muscles[16].

8) Mohamed Arshadh

Concluded that there is no significant difference in Hamstring muscle flexibility following Muscle energy techniques and Proprioceptive neuromuscular facilitation types of stretching. Both Muscle energy techniques and Proprioceptive neuromuscular facilitation types of stretching are equally effective on hamstring flexibility [17].

9) IzzetIslamoglu et al.

Researched the effect of different static stretching time on some physical performance parameters and concluded that the length of static stretching duration increased in flexibility. Also, static stretching decreased vertical jumping performance and did not affect speed and agility[18].

10) Cem Kurt, IlkayFirtin

Compared the acute effects of static and dynamic stretching exercises on flexibility, agility, fatigue index and anaerobic performance in professional football players concluded that static and/or dynamic stretching exercises can be applied in addition to aerobic running to enhance flexibility[19].

11) Yildirim MS et al.

Compare the effects of static stretching, proprioceptive neuromuscular facilitation (PNF) stretching and Mulligan technique on hip flexion range of motion (ROM) in subjects with bilateral hamstring tightness concluded that 4-week stretching intervention is beneficial for increasing hip flexion ROM in bilateral hamstring tightness. However, PNF stretching and Mulligan TSLR technique are superior to typical static stretching. These two interventions can be alternatively used for stretching in hamstring tightness[7].

12) Dr. PatitapabanMohanty et al.

Compare the effect of dynamic soft tissue mobilization and Mulligan traction straight leg raise in increasing hamstrings flexibility by active knee extension range of motion and passive SLR concluded that Mulligan's traction straight leg raise and Dynamic Soft Tissue Mobilization improved active range of knee and passive straight leg raise range of motion in normal individuals[5].

13) Bekie Mendes et al.

Purposed study to compare the flexibility and sprint performance values according to age and gender, the features of physical fitness performance of boys and girls who play football concluded that the relationship between speed and flexibility was varied by gender. The significant relation was found between flexibility values and 10 m sprint performance values of male footballers, while the significant relation was found between flexibility values and20 m sprint performance values of female footballers. In order to improve the sprint performance, which is a specific skill of football, flexibility of the muscles should be trained with a program at an early age[20].

14) F. Garcia-Pinillos et al.

Stated that Hamstring flexibility is a key factor for performing football-specific skills, such as sprinting, jumping, agility, and kicking in young football players and muscle flexibility must be specifically trained in football players beginning at early ages[2].

15) JesudasMazumdar et al.

Compared mulligan traction straight leg raise technique vs muscle energy technique on hamstring tightness in asymptomatic male concluded that Mulligan TSLR and MET are effective in reducing the hamstring tightness. When both groups are compared MET was found to be more effective than TSLR [21].

16) Mandeepkaur et al.

Compared the Effectiveness of Static Stretching Versus PNF Stretching of Hamstring Muscles Following Superficial Heat in Athletes and stated

both the methods of stretching were effective but the PNF group shows more improvement than static group, so the PNF stretching is more effective than static stretching[1].

17) Márk Váczi1. et al.

Investigate the effects of a short-term in-season plyometric training program on power, agility and knee extensor strength indicate that plyometric training consisting of high impact unilateral and bilateral exercises induced remarkable improvements in lower extremity power and maximal knee extensor strength, and smaller improvements in soccer-specific agility[22].

18) Pratishtha, K., Jagga, V.

Stated that Mulligan TSLR stretch is more effective than BLR stretch in improving biceps femoris muscle performance, flexibility and pelvic rotation[9].

19) Nagarwal A.K. et al.

Conducted a study to determine the effectiveness of two PNF stretching technique for improving hamstring flexibility and to compare the effectiveness of two PNF stretching techniques (Hold-Relax and Contract-Relax) for improving hamstring flexibility concluding that Both the techniques viz. PNF Hold Relax and PNF-CRAC are almost equal

in their clinical effectiveness for improving hamstring flexibility and that either of the techniques may be used in clinical practice for improving hamstring flexibility[23].

20) Anis Chaouachi, et al.

Investigated the effects of static and dynamic stretching alone and in combination on subsequent agility, sprinting, and jump performance concluded that individuals who wish to implement static stretching should include an adequate warm-up and dynamic sport specific activities with at least 5 or more minutes of recovery before their sport activity[24].

21) Pooja D Kapadia, et al.

Conducted a comparative study on immediate effects of traction straight leg and bent leg raise on hamstring muscle flexibility in normal individuals and stated that both Mulligan's Traction Straight Leg Raise and Bent leg Raise are effective in improving the hamstring muscle flexibility in normal individuals, but Mulligan's traction straight leg raise technique was more effective in improving hamstring flexibility[25].

7	**Materials and Methodology**

7.1. Source of Data

Krupanidhi football Academy

7.2 Method of Collection of Data

7.2.1Study Design

Two group Quasi experimental design

7.2.2 Sample Design

Purposive sampling technique

7.2.3 Sample Size

A sample of 82subjects with hamstring tightness college level football

According to the following calculations :

Sample size calculation:

$$SS_{UKP} = \frac{z^2\, p\, (1-p)}{e^2}$$

z= 1.96

p= power of confidence i.e. 68%

e= 0.05 type 1 error

$$SS_{UKP} = \frac{(1.96)^2 \times 0.68\, (1-0.68)}{(0.05)^2}$$

$$= \frac{3.8416 \times 0.68 \times 0.32}{0.0025}$$

$$= \frac{0.83593216}{0.0025}$$

= 334.372

= 334 (sample size for unknown population)

$$SS_{KP} = \underline{SS_{UKP}}$$

$1+ SS_{UKP}/ N$

$= \underline{334}$

$1+334/110$

$= 334 / 4.03636364$

= 82 (Sample size for known population)

7.3Selection criteria

1. Inclusion criteria:

A. College Level football players, all the participants were non-professional, collegiate and university-level competitive players. These players periodically participating in fitness training and conditioning, sport or other competition, practices or events requiring physical strength, agility, flexibility, range of motion, speed or stamina and who were not affiliated with an amateur, educational or professional athletic organization or any associated that sponsors athletic programs or events in the state[26].

B. Tightness of hamstring muscle evaluated under AKE[19, 1].

C. No recent injuries in trunk and lower extremities[19, 1].

D. Age - 18-23 years[19, 1]

E. Gender - male and female[19, 1]

2. Exclusion criteria:

A. Muscle soreness[19, 1]

B. Hamstring spasm or tendionopathy during last 6months[19, 1].

C. Inflammatory conditions of hip and knee joint[19, 1].

D. Neurological involvement of lower limb[19, 1]

E. Radiculopathy of lower limb[19, 1]

7.4 Outcome Measures

Active Knee Extension Test (AKE) :

Patient will be lying in supine lying position, the pelvis will be stabilized with the help of the stabilization strap. A rectangular frame is placed then the hip and knee is maintained at 90º with the reference to the rectangular frame.

Then the goniometer is placed over the lateral femoral condyle, with one arm aligned along the thigh in direction of the greater trochanter and the other arm aligned over the leg in the lateral

malleolus. The subject will be then instructed to extend the knee and hold this position for 2-3 seconds and the goniometer reading will be recorded[5].

Illinois Agility Test :

The length of the field will be 10m, while the width (separation between the beginning and the finishing point) will be 5m four cones were put at the focal points of testing zone at the distance of 3.3m from each other. The four cones will be utilized to stamp the beginning, finish, and two turning points.

The test will be performed by the subjects while lying face down, with their hands at the shoulder level. The trail will begin on the "GO" order and accordingly, the subjects ran as quick as could be expected under the circumstances. The trial will be finished when the players will cross the end goal without having thumped over any cones[19].

40 Yards Dash Test :

The subjects will run a full speed 40yards sprint on the field. The time will be recorded for sprint on hand held stop watch and the average time will be recorded to the nearest hundredth of a second for each subjects[27].

7.5 Study Duration

1 Year

7.6 Procedure

The ethical clearance will be obtained from the Institutional ethical committee. After explanation of procedure, a written informed consent will be taken from the individual participants. AKE test will be performed on the subjects and scores will be recorded accordingly. Based on the scores subjects will be categorised under hamstring tightness. Then the subjects will be divided into two groups. Randomization will be done for allocating into 2 groups.

Group A

PNF stretching will be given.

Group B

Mulligan traction straight leg raise stretching (TSLR) will be.

After dividing the subjects into two groups.

After that the participants pre testing will be done for flexibility using Active knee extension test, sprint using 40yards dash test and agility using Illinois test.

Group – A will be given PNF stretching i.e, Contract relax and Group – B will be given Mulligan TSLR stretching for 3times per week for 6 weeks.

After completion of 6-weeks of intervention the participants will be assessed for flexibility, sprint, and agility.

Methods of application

PNF STERTCHING :contract relax technique will be used. The subject will be lying supine the hip and knee will be maintained at 90º then the subject will be guided to perform the SLR. SLR will be performed until the subject feel the stretch of hamstring muscle. Then maintaining the same position for 15 seconds, the therapist will support the leg of participants at ankle. After that the subject will be instructed to perform the continuous contraction of muscles for 6sec and performing hip extension. The resistance will be applied at the ankle. After this the subject was asked to perform resisted hip flexion. The participant will be maintaining hip flexion for 6seconds. 30 seconds rest will be given at the end of each repetition of the above procedure. Total three repetitions will be given for each leg and continuous instruction were given[10, 23].

MULLIGAN TRACTION STRAIGHT LEG RAISE STRETCHING: In supine lying traction will be applied to the leg while lifting the limb through the pain free range of motion. The maximum traction force will be applied along the longitudinal axis of the leg while the knee remains extended. At the same time the limb will be passively moved through the range of motion until the beginning of inconvenience and afterwards it will come back to the resting position. It will be ensured that there will be no pain during the procedure. The direction of the leg raise will be altered if the subject complains of pain. Pain free three repetitions will be given to each subject[7] with 30seconds rest in between the repetitions.

After 6weeks of intervention data will be collected and analyzed.

Statistical Analysis

The data on response variables Sprint, Agility and Flexibility in both groups is carefully elicited and analyzed through following statistical technique by using statistical software SPSS version 20.0.

1) The descriptive measures of mean, range and standard deviation will be used to describe the pre and post score in both the groups.
2) T-test will be used to compare pre and post changes in flexibility , sprint and agility, in both the groups.

	7.7 Does the study require any investigation or intervention to be conducted on patients or other humans or animals? If so please describe. Yes, the study to be conducted on human subjects who are college level football players. ***7.8 Has ethical clearance been obtained from the subject and the institution?*** Yes, ethical clearance has been obtained from the institution.

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APPENDIX-I

CONSENT FORM

Title: Comparison Of Proprioceptive Neuro-Muscular Facilitation And Mulligan Stretching On Hamstring Tightness In College Level Football Players.

Principal Investigator: Amrita Mishra, MPT – Musculoskeletal and Sports

About this form:

This form gives you important information about a research study. Please read it carefully. One of our staff members will be with you to answer any questions you may have about the study and what you will be asked to do. If you decide to be a participant (called a "subject"), you will have to sign this form. We will give you a copy of it to keep.

Why is this research being done?

The purpose of this research is to find out the effectiveness of proprioceptive neuro-muscular facilitation and mulligan stretching on hamstring tightness in college level football players. We are inviting you to join the study. We would like about 82 people to take part in this study.

How long will I take part in this study?

You will spend 6 weeks from the beginning to the end of the study. During this time, you will come to this clinic for treatment and for testing.

What will happen in this research study?

If you agree to be in this study, you will be assigned randomly into groups to receive one of two treatment techniques. One of these is called Proprioceptive neuromuscular facilitation stretching.

The other group will receive mulligan traction straight leg raise technique. Before your program begins, you will perform a sprint, agility and flexibility test.

If you are in the proprioceptive neuromuscular facilitation group, you will come to the clinic and will take treatment. Thrice a week, you will visit clinic to take treatment.

If you are in the Mulligan Traction Straight leg raise group, you will come to the clinic thrice a week and will receive treatment. your daily activities with one of us.

You will return to the clinic to repeat the tests after 6 week of intervention.

What are the risks and possible discomforts from being in this research study?

During the intervention and during your activities program, it is possible that you could feel pain. You may feel tired at the end of the intervention or activities period. If this happens, a short rest period would be a good idea.

What are the possible benefits from being in this study?

You may feel more active and may be more comfortable doing your daily household and outdoor activities.

Every institution that has an IRB will have several additional "boilerplate"

sections. These will include:

1) Description of alternative treatments (if they exist)
2) Assurance that nonparticipation will not affect routine medical care
3) Financial compensation (if relevant)
4) Injury statement, indicating the patient's responsibility for cost of care if needed.
5) Contact individual including phone number.
6) Privacy and HIPAA authorization, explaining what information will be taken and how it will be used.
7) Right to withdraw from the study at any time without prejudice or bias

Statement of Subject or Person Giving Consent/ Assent

I have read this consent form. This research study has been explained to me, including risks and possible benefits (if any), other options for treatments or procedures, and other important things about the study. I have had the opportunity to ask questions.

If you understand the information we have given you, and would like to take part in this research study, and also agree to allow your health information to be used and shared as described above, then please sign below.

Name of the Subject:

Signature of the subject: **Date:**

Name of the Witness (if required):

Signature of the Witness: **Date:**

Statement of Individual Obtaining Consent:

I have explained the research to the study subject, and I have answered all questions about this research study to the best of my ability.

Investigator or Person Obtaining Consent form:

Date:

The question format of this sample form is taken from the standard Informed Consent

Form of Partners Human Research Committee, Partners HealthCare System,

Boston, 2007.

9	SIGNATURE OF CANDIDATE	
10	REMARKS OF GUIDE	Approved and Forwarded
11.1	NAME AND DESIGNATION	Dr. V. Kalidasan Professor Krupanidhi College Of Physiotherapy
11.2	SIGNATURE	
11.3	CO GUIDE (IF ANY)	
11.4	SIGNATURE	
11.5	HEAD OF DEPARTMENT	Dr. Milan Anand Principal Krupanidhi College of Physiotherapy
11.6	SIGNATURE	
12.1	REMARKS OF CHARIMAN AND PRINCIPAL	Approved and Forwarded
12.2	SIGNATURE	