



THE EFFECTIVENESS OF MULLIGAN'S BENT LEG RAISE[BLR] VERSUS DYNAMIC SOFT TISSUE MOBILISATION[DSTM] IN SUBJECTS WITH HAMSTRING TIGHTNESS IN NON -SPECIFIC LOW BACK ACHE

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ABSTRACT

BACKGROUND- Nonspecific low back ache could be a pain, muscle tension, or stiffness localized between an adjunct related to rib margin and inferior gluteal folds, without sciatica. Only 10% of the cases have a specific case. One in every of the chance factors is poor hamstring flexibility .

PURPOSE- To compare the effectiveness of mulligan's bent leg raise versus dynamic soft tissue mobilization in subjects with hamstring tightness in non – specific low backache.

METHODOLOGY- forty eight subjects, mean age 34.27 ± 5.30 were enrolled. Group A (24 = fifteen male and Nine females) received Transcutaneous electrical nerve stimulation (TENS), Mulligan's bent leg raise and conventional exercises. Group B (24 = Twelve males and Twelve females) received TENS, DSTM and conventional exercises, which underwent a 4 weeks of training program. The outcome measures were taken before the treatment and after the end of 4 weeks treatment program.

OUTCOME MEASUREMENTS- The outcome was measured by using Numeric pain rating scale(NPRS) for pain, Quebec back pain disability scale and Goniometer for Active knee extension test.

RESULT- There is a statistically significant improvement in both the groups but compared to Group-B, Group – A shows highly significant values in all parameters. **CONCLUSION-** Mulligan's bent leg raise (BLR) is proved to be more effective treatment when compared with Dynamic soft tissue mobilization, but Dynamic soft tissue mobilization is also a less effective treatment in reducing non-specific low backache, reducing hamstring tightness & improving functional ability in individuals with hamstring tightness in non- specific low backache.

KEYWORDS – Mulligan's bent leg raise, Dynamic soft tissue mobilization, Hamstring tightness, Numeric pain rating scale, Quebec back pain disability scale, Non-specific low backache, Active knee extension test.

INTRODUCTION

Non specific low backache is not due to a recognizable, renowned specific pathology to a recognizable, known specific pathology (eg: infection, tumour, osteoporosis, lumbar spine fracture, structural deformity, inflammatory disorder, radicular syndrome or cauda equine syndrome). Non- specific low backache is described as pain localized between 12th thoracic vertebra and inferior gluteal folds, a symptomatic of leg pain. The risk factors of non-specific low back ache are poor hamstring flexibility. There was a possible an attainable relation between delicate mechanical LBA and hamstring tightness. Tight hamstrings could be at risk of strain or tearing . Low backache has a lifetime prevalence of 60% - 85%. At any given time, about 50% of adults have low backache. Epidemiology of low backache estimates that the first episode of low backache ranges between 1.5% and 36%.



In human anatomy a hamstring is any one of the four posterior thigh muscles in between the hip and the knee(from medial to lateral) semimembranous, semitendinosus, the long head of the biceps femoris and the ischial head of adductor magnus(HYBRID MUSCLE). Muscular flexibility is an important aspect of normal human function, limited flexibility has been shown to predispose a person to several musculoskeletal overuse injuries and significantly affects a person's level of function.



MULLIGAN'S BENT LEG RAISE

Mulligan's Bent Leg Raise is a technique used for improving range of straight leg raise in subjects with LBP and/or referred thigh pain and to increase the flexibility of hamstring in patients with non specific low back pain. It was an intermediate effect after a single intervention. This is a painless technique, when indicated, can be tried on any patient with low backache who has limited or painful straight leg raising. It stretches the lower extremity muscles in combination of hamstrings, adductors and rotators.

DYNAMIC SOFT TISSUE MOBILISATION

Dynamic soft tissue mobilization is a relatively recent development in manual therapy in which it combines with therapist delivered manual treatment a number of different features such as joint, soft tissue positioning and movements involving either concentric or eccentric movements. It is widely believed amongst athletes, coaches and therapists that massage is an effective treatment for increasing flexibility. It is an efficient, pain free intervention that appears to have an immediate effect on improving hamstring flexibility.

OUTCOME MEASUREMENT TOOLS

Quebec back pain disability scale:

It is a questionnaire about the way low backache is affecting daily life subjects with back problems may find it difficult to perform some of these daily activities. This questionnaire has 20 questions related to activities of daily living and a scale of 0 to 5 for each activity. The scoring is done by count every digit, circled by the patient. The end score will be between 0 (no limitation) and 100 (totally limited).

Numeric pain rating scale

It is a segmented numeric version of the VAS in which a respondent selects a whole number(0-10) that best reflects the intensity of his/her pain. It is an 11 point scale ranges from 0-10. 0 is no pain, 10 is the most intense pain imaginable. The subject marked a value on the scale with the intensity of pain that they had experienced in the last 24 hours.

Active knee extension test

It was done to assess the hamstring flexibility and the range of active knee extension in the position of hip flexion. It was measured by using the Goniometer. The subject was in a supine lying position, and hips and knees 90-90°. Then the subjects was asked to extend his knee actively. Knee extension (lag >20°) was measured for both the lower extremities.



MATERIALS AND METHODOLOGY

Study design : A pre and post experimental study.

Study setting : The study setting was conducted in cherran's college of physiotherapy, Coimbatore.

Study population : Hamstring tightness with non specific low back ache patients were selected in this study.

Sample size: The sample size of 48 subjects were divided into 2 groups. Group –A= 24 and Group –B= 24.

Study duration: The study was conducted for a period of 6 months.

Treatment duration: The treatment duration of this study was conducted for a period of 4 weeks.

Inclusion Criteria

Age group between 18 – 40 years , hamstring tightness with non specific low backache patients and AKET (> 20° of knee extension lag).

Exclusion Criteria

Previous surgeries of the lumbar spine, ankylosing spondylitis and recent (< 2 weeks) epidural steroid injection for pain.

PROCEDURE

Mulligan's bent leg raise for Group – A:

The patient was in supine lying at edge of the couch. Hip and knee in 90° flexion and heel off the plinth. Therapist was standing at the side of the subject. Subject holds the plinth from the one side and places the hand of the affected side under his head and neck. Therapist placed the patient's flexed knee over therapist shoulder. Therapist shoulder of inner hand was placed under the popliteal fossa. Therapist grasped the lower end of thigh (very close to the popliteal fossa) with both hands. Longitudinal traction was applied along the long axis of the femur and took the hip into flexion until the first resistance was felt. If the subject complained about the stretch pain, then contract-relax was applied 3-4 times by asking the subject to push the therapist's shoulder gently for 5 seconds. Then the leg could be taken to a new pain-free range. Hold the end position for about 20 seconds. The exercises were repeated for 3 times for 10 minutes. The whole treatment duration for Mulligan's bent leg raise is 10 minutes with 1 session per day [totally 24 days] for 4 weeks.

Dynamic soft tissue mobilization for Group –B

To assess the hamstring muscle group, the patient was in the prone position and deep longitudinal strokes were applied to this entire muscle group to specify the area of tightness. The patient was in supine with the hip and knee flexed to 90°. Therapist stand at the side of the patient.

TECHNIQUE 1

Therapist applied a deep longitudinal strokes in a distal to proximal direction to the area of hamstring tightness when the leg was passively moved to the hamstring lengthened position. Therapist applied 5 strokes and 20 seconds of shaking was performed at the completion of this technique. The specific area of hamstring tightness was reassessed to determine whether the surface area of site of muscle tightness was reduced. If this reduction will occur, then the next progressive dynamic technique will be applied. However, if the area of muscle tightness doesn't reduce the treatment will be stopped.

TECHNIQUE 2

Ask the patient to actively extend their leg, in order to achieve the reciprocal inhibition of hamstrings.

TECHNIQUE 3

The patient were required to work the hamstring muscle group eccentrically by creating tension in the therapists hand as the muscle was elongated to the end ROM. Therapist performed five deep distal to proximal longitudinal strokes over the reduced hamstring area of muscle tightness. The whole treatment duration for Dynamic soft tissue mobilization is 20 minutes with 1 session per day [totally for 24 days] for 4 weeks.



EXERCISES

TENS and conventional exercises like isometric for lumbar muscles, bridging, trunk rotation, cat and camel exercises, partial curls, side planks, extension exercises like elbow press were taught. Ten repetitions were performed once with the treatment and were instructed to repeat the same exercises at home, as it should be done two times a day.

DATA ANALYSIS AND INTERPRETATION

Numeric pain rating scale, quebec back pain disability scale and active knee extension test pre and post treatment . Paired ‘t’ test was performed to analyse the level of significance of the study . The statistical analysis used in this study was paired ‘t’ test

TABLE.1: Mean values of NPRS comparison between group –A & B:

GROUPS	Pre test	Post test	Mean difference	S.D	T value at 0.005
A	7.05	3.5	3.54	6.52	2.704
B	7.25	5.25	2		

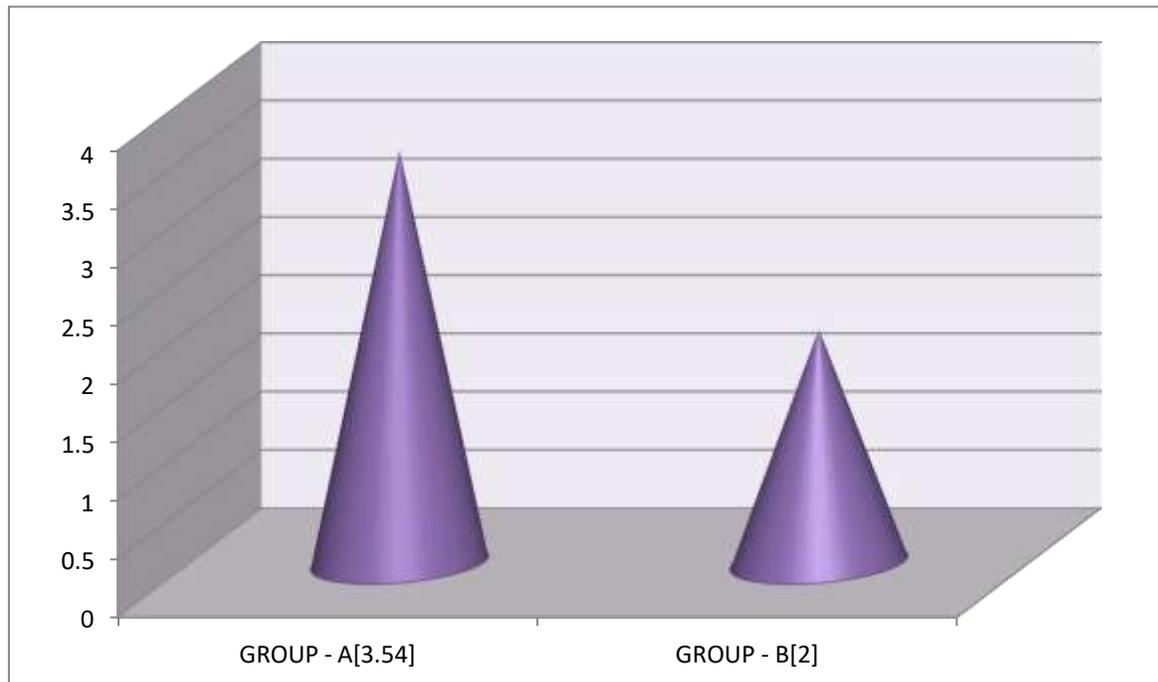




TABLE.2 : Mean values of goniometer for AKET [right side] comparison between group – A & B

Groups	Mean values	Standard deviation	Unpaired t test	Table t value at0.005
A	10.5	2.76	3.14	2.704
B	8.08			

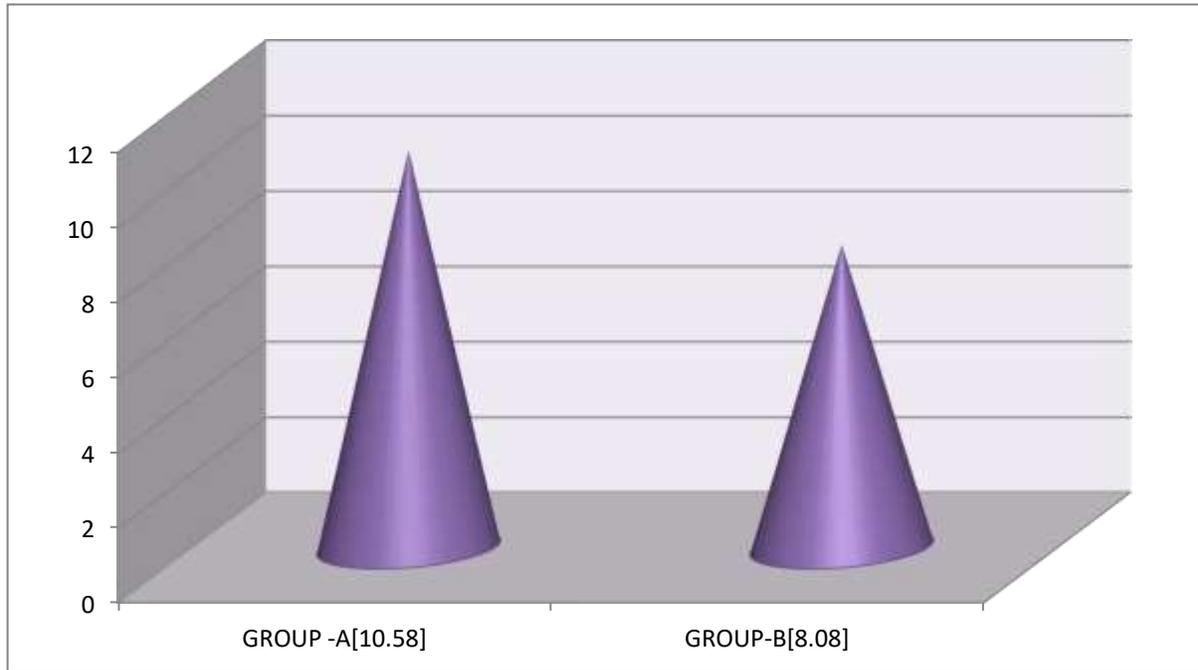


TABLE.3: Mean values of goniometer for AKET [left side] comparison between both the groups- A& B.

Groups	Mean values	Standard deviation	Unpaired t test	Table t value at0.005
A	10.58	2.16	4.58	2.704
B	7.83			

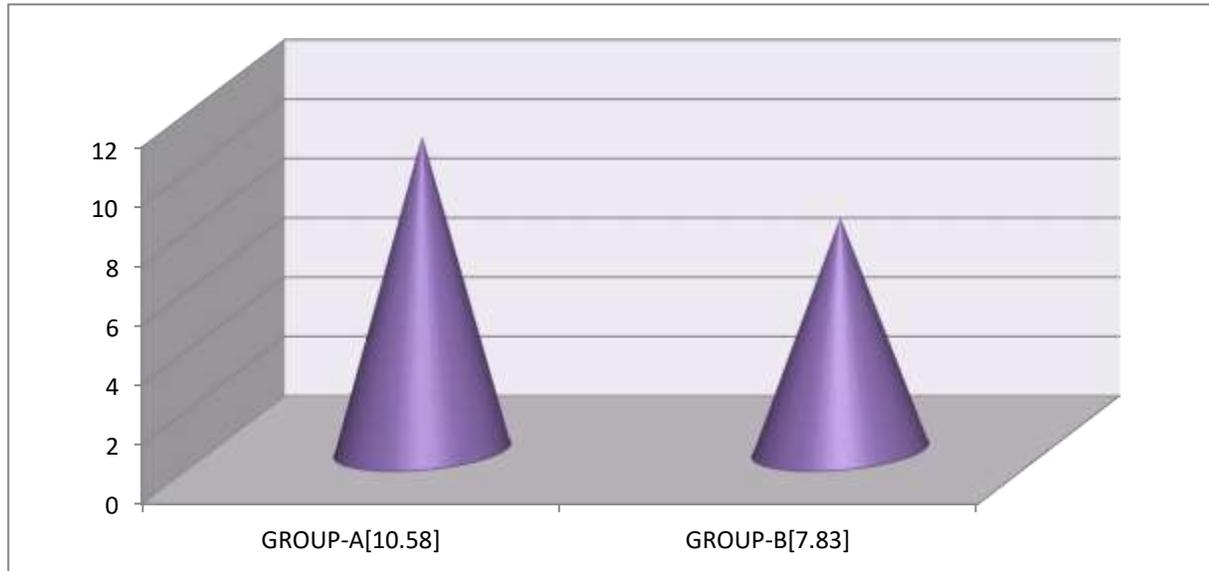
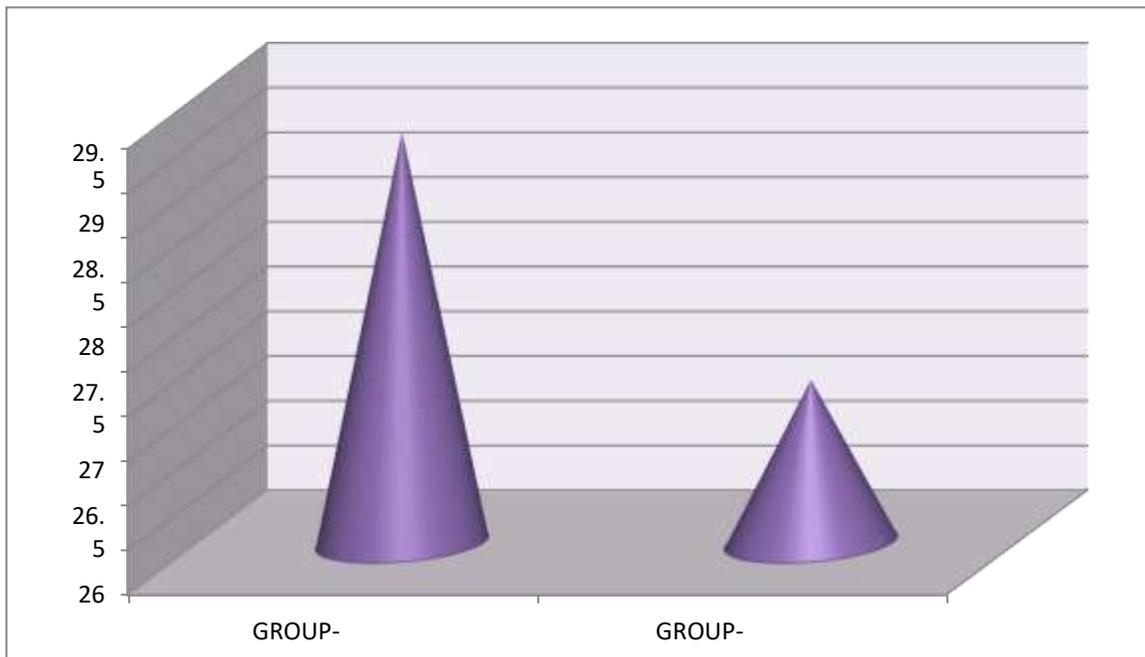


TABLE.4 : Mean values of quebec back pain disability scale comparison between group – A & B.

Groups	Mean value	Standard deviation	Unpaired ttest	Table t valueat 0.005
A	29.1	2.89	3.46	2.704
B	26.33			





RESULTS

The subjects of both the groups A & B are given treatment for a period of 4 weeks. Before the treatment the pre test values of NPRS(pain) , AKET and QBPDS are measured. After 4 weeks of treatment the post-test values of NPRS(pain), AKET and QBPDS are measured. The paired 't' test was used to compare the pre-test and post- test values of NPRS, AKET and QBPDS for both the groups. Based on the statistical analysis, the result of the present study shows that there is a significant improvement in both the groups – A & B following the effects of Mulligan's bent leg raise with TENS and conventional exercises and Dynamic soft tissue mobilisation with TENS and conventional exercises. The results concluded that group – A, who underwent Mulligan's bent leg raise with TENS and conventional exercises are more effective in reducing non specific low back pain and improving functional ability and reducing hamstring tightness than group –B.

DISCUSSION

Dr.Rabina sanjay nayak 2018 that after Mulligan's bent leg raise, there is a reduction of pain level by numeric pain rating scale and significant changes in ROM by goniometry with hamstring tightness in non – specific low backache. **Mohsin abbas 2017** concluded that after dynamic soft tissue mobilisation there is better results in improving the hamstring flexibility in cricket players. **Marchand S et al.(1993)** found out that TENS had significantly decreased the pain in comparison with placebo TENS and also TENS had an addictive effect for a short term of 1 week. So adding TENS in the study might have contributed to the reduction of pain.

Our study also suggested that the combined effects of Dynamic soft tissue mobilisation with TENS and conventional exercises has significant reduction in non specific low back pain and significant changes in functional ability and significant reduction in hamstring tightness. The number of subjects selected for the study was 48. The paired 't' test was used to compare the pre-test and post-test values of numeric pain rating scale , quebec back pain disability scale and active knee extension test for both the groups – A & B. Based on the statistical analysis the result of the present study shows that there is a significant improvement in both the groups – A & B following the effects of MBLR and DSTM.

On comparing group – A & B numeric pain rating scale, the calculated 't' value of group – A and B NPRS is 6.52 which is greater than the t-table value 2.704 is at 0.005 level significance. On comparing group – A & B for active knee extension test (right side) , the calculated t- value for group – A & B is 3.14 which is greater than the t – table value of 2.704 is at 0.005 level significance. On comparing t- value of group – A & B for active knee extension test (left side) is 4.58 which is greater than the t-table value of 2.704 is at 0.005 level significance. On comparing t – value of group – A & B for quebecback pain disability is 3.46 is greater than the t- table value of 2.704 is at 0.005 level significance.

CONCLUSION

In this study, we conclude that the subjects with hamstring tightness in non – specific low backache who underwent mulligan's bent leg raise [MBLR] with TENS and conventional exercises are more effective in reducing hamstring tightness and improving functional ability than the subjects with hamstring tightness in non – specific low backache who underwent dynamic soft tissue mobilization [DSTM] with TENS and conventional exercises in reducing hamstring non – specific low backache, reducing hamstring tightness and improving functional ability.

LIMITATIONS AND RECOMMENDATIONS

The duration of the study is only 4 weeks.

The study was limited with the specific age group between 18 – 40 years of age.

This study had conducted to the subjects with hamstring tightness in non – specific low backache.

Similar study can be done using longer duration.

Similar study can be done with other age groups.

Similar study can be done with more number of subjects.

Similar further studies can be conducted by comparing any manual therapy and electrotherapy modalities.

Acknowledgment

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Declarations

Conflicts of interest: Nil



Funding sources: Self

Ethical clearance: Verbal consent and written consent were taken from each subject who participated in the study and Ethical clearance from our Institutional Ethical committee (IEC)

REFERENCES

1. *Manual therapy: NAGs , SNAGs , MWMs, Brian mulligan, 6th edition.*
2. Karnati, V. , & Ali mohammed, A(2015) static versus PNF stretching in hamstring flexibility a comparative study. *International journal of physiotherapy*, 2(3), 513 – 517.
3. Hamstring muscle tightness: Reliability of an active knee extension test; C.M. Norris; *physical therapy journal* ; july ; 63(7); 1085 – 90. (2005).
4. Hall T, Hardt S , Schafer A, Wallin L, mulligans bent leg raise technology – a preliminary randomized trial of immediate effects after a single intervention . *manual therapy . 2006 may 1; 11(2): 130 – 5.*
5. Krismer M , van tulder M. non – specific low backache . *Best practice & research clinical rheumatology 2007 feb 1; 21 (1) : 77 – 91.*
6. Kumar D , *manual of mulligan concept revised edition ; New delhi ; capri institute of manual therapy, 2015 ; 60 – 62.*
7. Demoulin C, Ostelo R, Knotterus JA, Smeets RJ. Quebec Back Pain Disability Scale eas responsive and showed reasonable interpretability after a multidisciplinary treatment. *Journal of clinical epidemiology. 2010 Nov 1;63 (11): 1249 – 55.*
8. Marchand S, Charest J, Li J, Chenard JR, Lavignolle B, Laurencelle L. Is TENS purely a placebo effect ? A controlled study on chronic low back pain. *Pain . 1993 jul 1;54(1): 99 – 106.*
9. DeSantana JM, Walsh DM, Vance C, Rakel BA, Sluka KA. Effectiveness of transcutaneous electrical nerve stimulation for treatment of hyperalgesia and pain. *Current rheumatology reports. 2008 dec 1;10(6):492 – 9.*
10. Hopper D, Deacon S, Das S, Jain A, Riddell D, Hall T, et al. *Dynamic Soft Tissue*
11. Karnati, V. , & Ali mohammed, A(2015) static versus PNF stretching in hamstring flexibility a comparative study. *International journal of physiotherapy*, 2(3), 513 – 517.
12. Hamstring muscle tightness: Reliability of an active knee extension test; C.M. Norris; *physical therapy journal* ; july ; 63(7); 1085 – 90. (2005).
13. Hall T, Hardt S , Schafer A, Wallin L, mulligans bent leg raise technology – a preliminary randomized trial of immediate effects after a single intervention . *manual therapy . 2006 may 1; 11(2): 130 – 5.*
14. Krismer M , van tulder M. non – specific low backache . *Best practice & research clinical rheumatology 2007 feb 1; 21 (1) : 77 – 91.*
15. Kumar D , *manual of mulligan concept revised edition ; New delhi ; capri institute of manual therapy, 2015 ; 60 – 62.*
16. Demoulin C, Ostelo R, Knotterus JA, Smeets RJ. Quebec Back Pain Disability Scale eas responsive and showed reasonable interpretability after a multidisciplinary treatment. *Journal of clinical epidemiology. 2010 Nov 1;63 (11): 1249 – 55.*
17. Marchand S, Charest J, Li J, Chenard JR, Lavignolle B, Laurencelle L. Is TENS purely a placebo effect ? A controlled study on chronic low back pain. *Pain . 1993 jul 1;54(1): 99 – 106.*
18. DeSantana JM, Walsh DM, Vance C, Rakel BA, Sluka KA. Effectiveness of transcutaneous electrical nerve stimulation for treatment of hyperalgesia and pain. *Current rheumatology reports. 2008 dec 1;10(6):492 – 9.*
19. Hopper D, Deacon S, Das S, Jain A, Riddell D, Hall T, et al. *Dynamic Soft Tissue*
20. Croisier JL. Factors associated with recurrent hamstring injuries. *Sports Med. 2004; 34: 681 – 95*
21. Gajdosik R, Lusin G. Hamstring muscle tightness Reliability of an active – knee extension test. *Phys ther. 1983 ; 63:1085 – 90.*
22. Toby Hall, Sonja Hardt, Axel Schafer, Lena Wallin “mulligan bent leg raise technique – a preliminary randomized trial of immediate effects after a single intervention” *school of physiotherapy vol. 3, issue 5, 2005.*
23. Dr. Kumar Deepak(2015) *Manual of mulligan concept, lumbar spine revised edition, New Delhi, India, 60 – 64.*
24. Effect of single bout of passive stretching and Mulligan’s Bent Leg Raise (BLR) on Hamstring flexibility in young adults with asymptomatic bilateral hamstring tightness Oves Patni, Saravanan M, Aliya Sheikh, Ankita Juneja , Nazrana Sheikh , Ruchi Patel; *IOSR Journal of Dental and Medical*
25. *Sciences (IOSR – JDMS); Volume 9, Issue 3 (jul – aug. 2013), 13 – 17.*
26. Neha Jain, G.L. Khanna, Amit Chaudary: *Comparison between straight leg raise and bent leg raise stretching techniques for increasing hamstring flexibility, Indian Journal of Physiotherapy and Occupational Therapy 2009; 3(2)*
27. Jacek A.K., John M.E. et. Al. *The Quebec Back Pain Disability Scale: Conceptualization and Development Dep. of Preventive Medicine and Biostatistics, University of Toronto; 1995.*
28. Michael J. Alter . *Science of Flexibility . Human Kinetics, 2004, 355.*
29. Pratishtha K, Jagga V. Effect of Mulligan Stretching Techniques (TSLR AND BLR) on Biceps Femoris Muscle and Pelvic Rotation by using Surface EMG and Bubble Inclinometer respectively. *Journal of Exercise Science and Physiotherapy. 2012; 8(1):3.*
30. Carol A. Oatis. *Kinesiology , The Mechanics and Pathomechanics of Human Movement.*
31. Hoskins, W., Pollard, H. *The management of hamstring injuries – part 1: issues in diagnosis. Manual therapy. 2005. 10 (2), 96 - 107.*