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Original Research Article

Effect of Integrated Neuromuscular Inhibition Technique on Iliotibial Band Tightness in Osteoarthritis of Knee

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ABSTRACT

Background: Knee osteoarthritis is a degenerative disease, it also presents with soft tissue abnormalities such as iliotibial tightness and formation of trigger points, which produce pain and functional disability.

Objective: To evaluate effect of Integrated Neuromuscular Inhibition Technique on Iliotibial band tightness in osteoarthritis of knee.

Methods: Ethical clearance was obtained from Institutional Ethical Committee, KIMSDU, karad.54 subjects were selected and were equally divided into two groups. Group A was treated with conventional physiotherapy treatment. i.e. (Ultrasound, Hot moist pack, static exercises of quadriceps and hamstring, iliotibial band stretching) and Group B was treated with conventional physiotherapy and Integrated neuromuscular inhibition technique.

Results: Statistical test was performed using paired test and unpaired test. Pre intervention analysis done for Visual analogue scale (VAS) showed no significant difference with p value= 0.9884, for WOMAC scale p=0.8306, pressure algometer p=0.2270,100% sample were positive for IT band tightness on Ober's test. post interventional analysis done for VAS showed extremely significant difference, p=<0.0001, for WOMAC scale showed significant difference, p=0.0328, Pressure algometer showed extremely significant difference, p=<0.0001, Post interventional results of Ober's test among 68% of sample turned to be negative, which meant reduction of tightness was seen in 68% of sample.

Conclusion: The present study concluded that there is a significant effect of Integrated Neuromuscular Inhibition Technique on iliotibial band tightness in osteoarthritis of knee

Keywords: Osteoarthritis, Integrated neuromuscular inhibition technique, Iliotibial band stretching, Ischemic compression, Positional release therapy, Muscle energy technique.

INTRODUCTION

Osteoarthritis is characterized by the progressive loss of hyaline articular cartilage, in which the articular cartilage degenerates with fibrillation, fissure, ulceration, and full thickness loss within the joint surface. (1) In India the prevalence of

osteoarthritis is 22% to 39%. (2) It commonly affects the age group of 50 years and above. (3)

Knee OA shows degenerative changes like medial compartment cartilage loss, joint narrowing and tibial plateau collapse which further leads to increased

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adduction moment and Varus deformity, thus it alters the relationship of the ITB and the lateral epicondyle with the possibility of an inflammation of the lower part of ITB due to increase friction at the knee joint. (4) The unrecognized cause of lateral knee pain is Iliotibial Band Friction in patients with medial compartment knee OA. (5) These restrictions in fascia is responsible for myofascial trigger point formation which increases the tension in the Iliotibial band which results in spot tenderness, muscle and fascial tightness. (4)

INTEGRATED NEUROMUSCULAR INHIBITION TECHNIQUE: (6)

The INIT techniques includes,

- Ischemic compression
- Positional release
- MET

This is a combined approach of three techniques which provides triple effect by ischemic compression, Positional release, followed by isometrically enhance stretch. The sequence of techniques represents a significant advance in deactivating trigger points and relieves tightness. (6)

MATERIALS AND METHODS

A total 54 participants with OA knee willing to take treatment for 2 weeks were recruited for the study. The subjects were screened and were put in either of the groups Group A received conventional treatment (hot moist pack, ultrasound, Isometric exercises of hamstring and quadriceps, and iliotibial band stretching) Group B received conventional treatment and INIT by consecutive sampling method. A written informed consent was taken from each participant. Ethical Clearance was obtained from University's Institutional Review Board. Inclusion criteria were both male and female subjects between 50 and 70 years of age. Grade 2 **3according** Grade to (Kellgrenand Lawerence classification of OA) and subjects with Iliotibial band tightness tested with Ober's test and presence of trigger point.

Pre -Test

VAS was used to assess the pain.

WOMAC scale was used to assess the disability of patient

Pressure Algometer was used to assess the pain pressure threshold.

Ober's test was used to assess the iliotibial band flexibility.

- Treatment protocol include hot moist pack, ultrasound, Isometric exercises of hamstring and quadriceps, iliotibial band stretching in Group A
- Treatment protocol included hot moist pack, ultrasound, Isometric exercises of quadriceps and hamstring, iliotibial band stretching, Integrated neuromuscular inhibition technique in Group B.
- The treatment was given for 2 weeks with 5 sessions per week.

PROCEDURE:

Both the group received Ultrasound with a dosage of 1MHz in frequency, continuous mode and 0.8W/cm^2 of intensity for 7 min. ⁽⁷⁾ and static exercises of quadriceps and hamstring each time every exercise was repeated 10 times in 3 sets. There was 1-3 min. rest between sets. Iliotibial band stretching: This stretch position is held for 30 sec. and this procedure is repeated for 3 times was given in common as part of the conventional treatment.

Group A: Conventional treatment
Group B: Conventional treatment and INIT

INIT, involves the application of sequence that includes; (8)

- Ischemic compression (IC)
- Positional Release Therapy(PRT)
- Muscle energy technique(MET)

The patient is first assessed and the trigger point is plotted. The patient is taken in side lying position to treat the superior limb, which was slightly flexed at both hip and knee. This is done to obtain maximum relaxation for IT band release.

ISCHEMIC COMPRESSION (IC):

The therapists apply a relevant pressure by her thumb pad on the trigger point. The pressure is gradually increased until the tissue resistance is identified. The pressure is unchanged until a tissue barrier is released. The pressure is further applied until a new tissue resistance is felt. This Procedure is continued till no resistance is felt or hold for 20 sec.

POSITIONAL RELEASE THERAPY (PRT):

Considering the VAS score the pressure is applied and increased as per the patients' pain tolerance. The pain is removed from trigger point by finding a position of ease; position of ease was identified by movement of knee either in flexion or knee extension. The pain free positions are maintained for 20 sec. and repeat the procedure for three to five times per treatment session.

MUSCLE ENERGY TECHNIQUE (MET):

The treatment protocol is concluded by MET applied towards the affected IT band every isometric contraction was held for 7 to 10 sec. for 3-5 times per session. The patient is in supine lying during the treatment session. The affected leg is adducted and the unaffected leg overlaps to prevent adduction. The therapist applies resistance at the distal end of tibia and asks the patient to adduct the affected leg against resistance with 25% strength. This voluntary action leads to activation of lateral fibres of IT band. This technique repeated three times per session.

STATISTICAL ANALYSIS:

The statistical analysis was done using paired 't' test and unpaired 't' test.

- Paired 't' test was used for statistical analysis of pre and post intervention within group.
- Unpaired 't' test was used for between group statistical analysis of Group A and Group B.

RESULTS

Table no. 1 Post interventional intergroup analysis - VAS

	Mean±SD	Median	'P'	Inference
GROUP A	3.477±1.088cm.	3.400 cm.		Extremely significant
GROUP B	2.281±0.830cm.	2.300 cm.	< 0.0001	

Table no. 2 Post interventional intergroup analysis - WOMAC Scale

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	Mean±SD	Median	'P'	Inference	
GROUP A	39.407±9.349	38.00		Considered significant	
GROUPB	32.481±13.483	32.00	0.0328		

 ${\bf Table\ no. 3\ Post\ interventional\ intergroup\ analysis-Pressure\ algometer}$

	Mean±SD	Median	'P'	Inference
GROUP A	18.701±5.026kg/cm ²	17.660 kg/cm ²		Extremely significant
GROUP B	37.268±7.347kg/cm ²	36.330 kg/cm ²	< 0.0001	

Table no. 4 Post interventional analysis - Ober's test

	PRE Treatment	POST Treatment	
	POSITIVE TEST	NEGATVE TEST	%(Percentage)
GROUP A	27	15	55%
GROUP B	27	22	81%

1. Visual analogue scale:

In the present study pre interventional mean VAS score was 8.240±0.992 cm. in group A and 8.237±0.857 cm. in group B whereas post-interventional mean of VAS score was 3.477±1.088 cm. in group A and 2.281±0.8307 cm. Pre-interventional analysis showed no significant difference between group A and group B (p=0.9884) Post intervention analysis showed extremely

significant difference between group A group B .P=<0.0001)

Intra group analysis revealed statistically extremely significant for both the groups. Group A(P=<0.0001), Group B (<0.0001).

2. WOMAC SCALE:

In the present study pre interventional mean of WOMAC sore was 56.629 ± 12.432 in group A and 57.333 ± 11.609 in group B whereas post interventional WOMAC score

was 39.407±9.349 in group A and 32.481±13.483 in group B respectively. .pre interventional analysis showed no significant difference between group A and group B (P=0.8306).post interventional analysis showed significant difference between group A and group B.(P=0.0328) Intra group analysis revealed statistically extremely significant for both the groups Group A (P=<0.0001), Group B (<0.0001)

3. Pressure algometer:

In the present study pre interventional mean of pressure algometer score was $16.020\pm5.352~{\rm kg/cm^2}$ in group A and $17.724\pm4.878~{\rm kg/cm^2}$ in group B whereas post interventionally mean of pressure algometer score was $18.701\pm5.026~{\rm kg/cm^2}$ in group A and $37.268\pm7.347~{\rm kg/cm^2}$ in group B respectively. Pre interventional analysis showed no significant difference between group A and group B (P=0.2270) post intervention analysis showed extremely significant difference between group A and group B (P=<0.0001).

Intra group analysis revealed statistically very significant for Group A (p=0.0017) and extremely significant for Group B (P=<0.0001).

4. Ober's test:

In the present study Pre intervention 100% sample were positive for IT band tightness on Ober's test. In group A 55% and in Group B 81% of sample turned to be negative, which meant reduction of tightness was seen.

DISCUSSION

Osteoarthritis of knee is the major disabling degenerative condition of synovial joint it usually affects the weight bearing joints of lower extremity such as knee ankle and hip joint commonly. It occurs due to the wearing and tearing forces on the articular surfaces of the joint it affects the activities of daily living with the pain and stiffness of affected joint.

The incidence of osteoarthritis of knee in India is 22-39%. (2) It mainly affects the individual age group of 50 years and above (3)

Considering the degenerative changes occurring in OA like medial compartment cartilage loss, joint narrowing and tibial plateau collapse which further lead to increase adduction movement and varus deformity. These changes alter the normal mobility pattern of IT band in relation to lateral condyle of femur. This may results in increased friction at the knee joint leading to inflammation of distal part of iliotibial band. (9)

This inflammation further results in reduced mobility of connective tissue. When deeply correlated it demonstrates loss of substance. water and adhesions formed from scar tissue that adheres to adjacent non- traumatized connective tissue. These restricted fascia is a measure cause for formation of myofascial trigger points. This trigger point increases tension in Iliotibial band which further leads to spot tenderness and muscle tightness. (4) The main purpose of the study is to evaluate the effect of INIT on IT band tightness in knee OA.

In the present study, 54 subjects clinically diagnosed with knee OA and fulfilling inclusion and exclusion criteria with age group between 50-70 years were included in the study. They were allocated in to two groups Group A and Group B each containing 27 subjects.

The mean age of the participants in group A was 59.481 ± 6.471 and in group B was 61.925 ± 6.158 , which showed there is no significant difference between the mean ages of the participants in both groups. (t_{18} =1.428,p=0.1592). The study finding correlates with the findings of other available literatures which states that, this condition affects the age group of 50 years and above. (3)

The total numbers of participants included were 54 out of which 29 were male and 5 were female. Group A contains 14 male and 13 female whereas Group B contained 15 male and 12 female. Many studies stated that females are more commonly affected with OA as compared to male. (10) The present study contradicts the

findings of previous studies where males are affected more than females, which may be because of smaller sample size.

Out of 54 subjects 25 (Group A =11, Group B=14) had right side OA and 29 (Group A =16, Group B=13) had left side OA.

In this, the effects of INIT on iliotibial band tightness in OA of knee were investigated. They were investigated using VAS, WOMAC, PPT, Ober's test.

The treatment was given for 2 weeks with 5 sessions per week.

The pain reduction can be explained possibly due to hot moist pack and ultrasound. Heat application enhances capillary blood pressure and increased cellular permeability which shows temporary swelling and edema. Heat application helped in increasing blood flow and local metabolic activity. (10)

This correlates with the findings of this article Ashraf Ramadan Hefez, Knee Osteoarthritis: A Review Of Literature. (10)

Pain reduction due to Ultrasound may be the result of increased capillary pourability and tissue metabolism, enhancing the fibrous tissue extensibility and improving the pain threshold by thermal effect.

These findings correlate with study of A. Loyola- Sanchez, concluded that, ultrasound could be efficacious for decreasing pain and may improve physical function in patients with knee OA. (11)

Stretching of Iliotibial band may be the possible reason for improved flexibility of iliotibial band. The length of sarcomere increases due to stretch, which helps to reduce the trigger point and muscle tightness which further results in improved pain pressure threshold. Stretching also causes decrease pain and improve functional ability.

These findings correlate with the study of D Rupareliya, concluded that iliotibial band stretching along with conventional physiotherapy helps in reducing pain, and improve function in patients with unilateral knee osteoarthritis. (2)

The effect of isometric exercises of quadriceps and hamstring, application of hot moist pack, and Ultrasound and contributed to pain reduction along with stretching which also improved flexibility. All this factors might have measured and contributed in improving functional status which was assessed by the WOMAC score.

These correlates with the study of Ahmedh Al-JohAni, PT Strengthening of the hamstrings in addition to strengthening of the quadriceps was shown to be beneficial for improving subjective pain, range of motion and decreasing the limitation of functional performance of patients with knee osteoarthritis. (1)

In INIT there are 3 techniques which includes IC.PRT, METConsidering the effect of IC, compressing the trigger point possibly must have caused reactive increased local temperature leading to counter irritant effect. The spinal reflex mechanism can get activated due to these impulses which could have helped in pain reduction. Another possible cause could be the stimulation of mechanoreceptors which has a good correlation with the pain gate mechanism. After the release of compression pressure these receptors might have decreased the sensitivity of painful trigger point in ITB. (13)

The PRT technique helped in improving the flexibility in this present study. This may be possibly due to its mechanism of automatic resetting of the muscle spindles. The muscle was kept in a shortened position during application of technique which causes no harm to the muscle in spasm. This might have improved soft tissue mobility and decreased stresses on pain sensitive structures and thus resulted in increased PPT. (14)

In MET the muscle works against the resistance which activates the muscle and joint mechanoreceptors this results in firing of local somatic efferent. This further causes sympatho-excitation and activation of descending modulation of pain. This may be the reason for reduction of pain. (12)

A decrease in pain and improved flexibility of muscle leads to an improvement in overall functional ability as shown on the WOMAC score.

Beneficial effect of MET has also been noted in improving ROM and muscle extensibility owing to its mechanism of increased tolerance to stretch. (15)

Thus, it could be stated that INIT may help in reducing trigger point which in turn leads to decreased muscle tightness and reduction of pain which causes improvement in functional ability.

These findings are correlate with the study of Shagun Aggarwal concluded that, there is a sufficient evidence to prove the efficacy of INIT in improving cervical function by reducing the trigger points on upper trapezius muscle. (12)

Sibby et al. concluded that both INIT and Laser with stretching are equally effective in managing subjects with neck pain due to upper trapezius trigger point. (14)

Alshyma S Abd EI-Azeim concluded that This study concluded that INIT and Kinesio therapy are most effective methods in the management of subjects with active trigger points at upper trapezius myofascial trigger points with superiority for INIT. (16)

Rajesh Sewani, Sandeep Shinde concluded that HMP and MET in combination are effective in management of sacroiliac joint dysfunction. (15)

After comparing with the previous study, INIT technique is important for trigger point deactivation in IT band.

In the present study, it suggested that INIT along with conventional treatment is important and also helps in improving Iliotibial band flexibility and knee function.

CONCLUSION

The present study concluded that, INIT along with conventional treatment plays an important role in reduction of trigger point, which results in improves Iliotibial band flexibility and ultimately improves knee function.

REFERENCES

- 1. Ahmed H Al-Johani, PT, ShajiJohn Kachanathu, Ashraf Ramadan Hafez, AbdulazizAl-Ahaideb. Abdulrahman AbdulmohsenMeshariAlroumi, DAlgarni, AqueelM. AlenaziPT Comparative Study Of Hamstring And Quadriceps Strengthening Treatments In The Management Of Knee Osteoarthritis. J.Phys. TherSci.Vol. 26, No. 6, 2014818.
- 2. D Rupareliya, YShukla. The effect of "iliotibial band stretching" on pain and function in patients with unilateral osteoarthritis of knee joint- An interventional study. Medpulse International Journal of physiotherapy, Volume 1, Issue 2, February 2017.
- 3. Ashraf Ramadan Hafez, Ahmed H Al-Johani, Abdul Rahim Zakaria, Abdulaziz Al-Ahaideb, Syamala Buragadda, Ganeswara Rao Melam, Shaji J Kachanathu. Treatment Of Knee Osteoarthritis In Relation To Hamstring And Quadriceps Strength. J. Phys Ther Sci. Vol.25(11), 2013 Nov.
- 4. EbtessamFawzyGomma and Lilian AlbertZaky Effect Of Iliotibial Band Myofascial Release On Flexibility And Patellar Alignment In Patients With Knee Osreoarthritis .International Journal of Advanced Research (2015), Volume 3, Issue 4, 399-410.
- 5. Vasilevska V, SzimiesU&Staebler A(2009): Magnetic resonance imaging signs of iliotibial band friction in patients with isolated medial compartment osteoarthritis of the knee. Skeletal Radiol;38,871-5.
- 6. Leon Chaitow, Judith DeLany, Dennis Dowling, Howard Evans. Modern neuromuscular Techniques.page no.216.
- 7. Naryana Cristina Mascarin, Rodrigo Luiz vancini, Marilia dos vantos Andrade. Effect of kinesiotherapy and ultrasound and electrotherapy in management of bilateral knee osteoarthritis: prospective clinical trial. BMC Musculoskeletal Disorders 2012, 13:18.
- 8. Leon Chaitow, Judith DeLany, Dennis Dowling, Howard Evans Modern Neuromuscular Techniques.page no.56-64
- Vasilevska V, Szeimies U, Samardziski M & Stabler A (2012): Knee Osteoarthritis and Associated Periarticular Conditions: Iliotibial Band Friction and Bakers Cyst, Osteoarthritis - Diagnosis, Treatment and

- Surgery, prof. Qian Chen (Ed.), ISBN:978-953-51-0168-0, In tech, Available from:
- Ashraf Ramadan Hafez, Aqeel Mohammed Alenazi, Shji John Kachanathu, Abdul Mohsen Meshari Alroumi and Elham Saed Mohamed. Knee Osteoarthritis: A Review Of Literature. Phys Med Rehabil Int 1(5): id1021 (2014)-Page-02.
- 11. Loyola- Sanchez, J Richardson, N, J, MacIntyre. Efficacy of ultrasound therapy for the management of knee osteoarthritis: a systemic review with metaanalysis. Osteoarthritis and cartilage 18 (2010) 1117-1126.
- 12. Shagun Aggarwal, Garima Bansal. Efficacy Of Integrated Neuromuscular Inhibition Technique In Improving Cervical Function By Reducing The Trigger Points On Upper Trapezius Muscle: A randomized controlled trial. Muller Journal Of Medical Sciences and Research. Volume 9; Issue 1; January-June 2018.
- 13. Travell J, Simons DG. Myofacial pain and dysfunction. The trigger point manual. The

- lower extremities. 1st ed. Vol. II. Baltimore, MD: Lippincott Williams & Wilikins;1999
- 14. Sibby, George Mathew, Narasimman, Kavitha Vishal, S. Effectiveness of integrated neuromuscular inhibitory technique and LASER with stretching in the treatment of upper trapezius trigger points. Journal of exercise science and physiotherapy, Vol.5, No.2:115-121, 2009.
- 15. Rajesh Sewani, Sandeep Shinde. Effect Of Hot Moist Pack and Muscle energy technique in subjects with Sacro-illiac Joint Dysfunction. IJSR, Volume 6 Issue 2, February 2017.
- 16. Alshaymaa S Abd E1-Azeim, Salah Eldin B Ahmed, Amira H Draz, Haytham M Elhafez, Omaima M Kattabei. Integrated neuromuscular inhibition technique versus kinesio tape On upper trapezius myofascial trigger points A Randomized Clinical Trial. Int J Physiotherpy Vol.5(3), 105-112, June (2018).

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