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EFFECT OF TRIGGER RELEASE ON THE PES ANSERINUS VERSUS CONVENTIONAL THERAPY ON PAIN, KNEE RANGE OF MOTION, AND FUNCTIONAL ACTIVITY IN PATIENTS WITH KNEE OSTEOARTHRITIS: A PILOT STUDY

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ABSTRACT
Background
Knee osteoarthritis (OA) is a degenerative joint disorder characterised by progressive deterioration of hyaline cartilage, resulting in pain, restricted range of motion (ROM), and functional impairment. Knee OA is a leading cause of disability among adults, and the global prevalence of the condition rises considerably with age.[1] Although numerous conservative physiotherapy interventions have been used to manage knee OA, complete relief of symptoms is often not achieved, prompting continued exploration of adjunctive soft-tissue-based approaches such as trigger point release directed at the pes anserinus. The objective of this study is to compare, the effect of trigger release on the pes anserinus combined with exercise against conventional therapy (transcutaneous electrical nerve stimulation [TENS] with knee exercises) on pain intensity, knee ROM, and functional activity in patients with knee OA.
Methods
A total of 26 patients (n = 26) diagnosed with knee OA were randomly allocated into two equal groups of 13 patients each. Group A received trigger release on the pes anserinus combined with exercise; Group B received conventional therapy consisting of TENS with knee exercises. Both groups were treated for four sessions per week over four weeks. Outcomes were assessed at baseline (time = 0) and at the end of four weeks using the Numerical Pain Rating Scale (NPRS) for pain intensity, a Universal Goniometer for knee ROM, and the Lower Extremity Functional Scale (LEFS) for functional activity.
Results
Data were analysed in SPSS version 24 using the paired t-test (within-group) and independent-samples t-test (between-group), following normality testing with the Shapiro–Wilk test; significance was set at $p < 0.05$. Both groups showed highly significant within-group improvement across all outcomes ($p < 0.0001$).
Conclusion
Within the limitations of the study, the findings suggest that trigger release on the pes anserinus combined with exercise produced a statistically greater improvement in pain, knee ROM, and functional activity than conventional TENS-based therapy in patients with knee osteoarthritis, supporting adoption of the alternative hypothesis. Replication in larger, methodologically rigorous trials is recommended before broad clinical adoption.

KEYWORDS: Knee osteoarthritis; Pes anserinus; Trigger release; Transcutaneous electrical nerve stimulation; Range of motion; Functional activity

INTRODUCTION

Osteoarthritis (OA) is a chronic degenerative joint disorder characterised by progressive breakdown of articular hyaline cartilage, subchondral bone remodelling, osteophyte formation, and low-grade synovial inflammation. The knee is among the joints most frequently affected, and pain is widely regarded as the principal symptom driving disability, since it restricts mobility, muscle activation, and participation in daily activity. Pooled population-based data indicate a global prevalence of knee OA of approximately 16.0% in individuals aged 15 years and above, rising to approximately 22.9% among those aged 40 years and above, with a markedly higher burden in women.[1] Beyond localised pain, knee OA is associated with reduced range of motion (ROM), quadriceps weakness, gait alteration, and progressive functional decline, with consequent reduction in occupational participation and health-related quality of life.

Conservative physiotherapy remains the first line of management for knee OA and typically combines education, therapeutic exercise, and electrophysical modalities. Transcutaneous electrical nerve stimulation (TENS) is commonly used as an adjunct to exercise and is thought to act via segmental and descending pain-inhibitory mechanisms; however, large placebo-controlled trials of TENS in knee OA have produced mixed evidence regarding its benefit beyond exercise and education alone.[7]

The pes anserinus is formed by the conjoined tendinous insertions of the sartorius, gracilis, and semitendinosus muscles on the anteromedial proximal tibia, approximately five centimetres distal to the medial joint line.[2] Pathology at this site, including bursitis and tendinopathy, is a recognised source of medial knee pain and is reported more frequently in patients with knee OA, with symptom severity correlating with the degree of degenerative change in the joint. Myofascial trigger points — discrete, hyperirritable nodules within taut muscle bands — have similarly been identified as a pain-contributing component of knee OA.[3,5] Manual trigger point release aims to reduce local muscular hypersensitivity and mechanical restriction; trials of related trigger-point-directed techniques, including release massage and dry needling, have reported improvements in pain and function across musculoskeletal populations, including knee OA.[4,6] These findings provide the anatomical and clinical rationale for directing trigger release specifically at the pes anserinus in patients with knee OA.

Although exercise-based therapy and TENS are well established in knee OA management, comparatively few randomized studies have examined manual trigger release directed specifically at the pes anserinus, despite the documented association between pes anserinus pathology and knee OA severity. A direct comparison between trigger release on the pes anserinus with exercise and conventional TENS-based therapy is therefore clinically relevant, and may clarify whether soft-tissue-directed intervention at this site confers additional benefit for pain, ROM, and functional activity. The present study was designed to investigate this question in a randomized, prospective design.

Aim of the study is to investigate, in a randomized prospective study, the effect of trigger release on the pes anserinus over conventional therapy in patients with knee osteoarthritis. Primary Objective is to compare the effect of trigger release on the pes anserinus combined with exercise (Group A) against conventional therapy consisting of TENS with knee exercises (Group B) on pain intensity in patients with knee osteoarthritis. The Secondary Objectives is to compare the effect of the two interventions on knee range of motion (ROM) and Functional activity.

Null Hypothesis (H_0) states There is no statistically significant difference between trigger release on the pes anserinus with exercise and conventional therapy (TENS with knee exercises) in pain intensity, knee ROM, or functional activity among patients with knee osteoarthritis.

METHODOLOGY

A randomized, prospective, comparative study was conducted to evaluate the effect of trigger release on the pes anserinus against conventional therapy in patients with knee osteoarthritis. The study was conducted at two sites: M.S. Physiotherapy Clinic, and the Physiotherapy Outpatient Department, ACS Medical College and Hospital, Chennai. The study population comprised patients clinically diagnosed with knee osteoarthritis presenting to the study settings. A total of 26 patients (n = 26) were enrolled and randomly assigned into two equal groups of 13 patients each (Group A, n = 13; Group B, n = 13). Sample selection criteria (INCLUSION CRITERIA) patients within the age group of 40 - 65 years, with both sex, Patients diagnosed with grade 2 or 3 OA of the knee radiologically, according to the Kellgren-Lawrence scale (12). Patients diagnosed with OA knee by clinical examination., as defined by American college of Rheumatology. Patients who can able to ambulate, Pain rating greater than 3 in NPRS grading.

EXCLUSION CRITERIA Patients with bilateral OA knee, with deformities & contractures, Uncontrolled diabetes and hypertension, Dementia, Neurological disorder, with anesthetic skin, open wounds, Traumatic O.A. knee, any other surgeries in and around knee, Intra articular injection in last 4 weeks, Infective arthritis, Inflammatory joint disorders, Other Rheumatoid disorders

Group A received trigger release on the pes anserinus combined with exercise; Group B received conventional therapy consisting of transcutaneous electrical nerve stimulation (TENS) with knee exercises. Both groups were treated for four sessions per week over four weeks. Trigger Release was applied with a steady localized pressure for a short period. Frequency of the session can be repeated 5-6 repetition. Always following the release with gentle stretching of the specific muscle. TENS was applied with the frequency >10 Hz (up to 200 Hz) was classified as meets pre-specified criteria, Intensity sufficient to produce a sustained sensory perception, ranging from a distinct but comfortable sensation to the maximum tolerable level [35,36]. Intensity was classified as does not meet pre-specified criteria if it: (1) triggered motor activation which was treated as a distinct delivery feature (not evidence of harm) and coded as does not meet pre-specified criteria for sensory-level intensity; (2) was fixed without individual calibration; or (3) restricted participant-driven adjustment during sessions, which is necessary to counteract habituation. Session duration of at least 15 min, based on evidence suggesting this threshold yields optimal analgesic outcomes in KOA. A minimum of 10 treatment sessions was treated as an operational, pre-specified exposure threshold, based on evidence supporting cumulative effects in chronic pain conditions.

Exercise Protocol

Exercises	Hold count	Repetition / session	Sessions / day
Isometric quadriceps	5	10	3
Isometric Hamstring	5	10	3

SLR	5	10	3
Heel Slides	-	10	3
Short Arc quadriceps	5	10	3

Outcome Measures and Assessment Procedure are done as follows, Pain intensity was assessed using the Numerical Pain Rating Scale (NPRS), an 11-point self-report scale ranging from 0 (no pain) to 10 (worst pain imaginable). Knee ROM was assessed using a Universal Goniometer aligned with standardized bony landmarks. Functional activity was assessed using the Lower Extremity Functional Scale (LEFS), a 20-item self-report questionnaire developed by Binkley and colleagues, scored from 0 to 80, with higher scores indicating better functional status.[8] All three outcome measures were recorded at baseline (time = 0) and at the end of the four-week treatment period.

Statistical Analysis

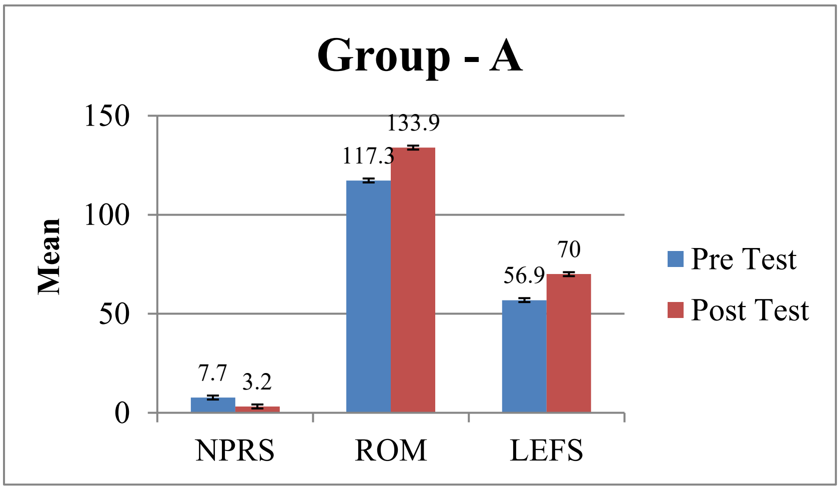
Data were tabulated and analysed using both descriptive and inferential statistics in the Statistical Package for the Social Sciences (SPSS), version 24, with statistical significance set at $p < 0.05$ and a 95% confidence interval applied throughout. The Shapiro–Wilk test was used to assess normality of distribution for the NPRS, ROM, and LEFS data. As the data satisfied the assumptions required for parametric analysis (continuous, interval/ratio-scaled variables with an acceptable distribution), parametric tests were applied: the paired t-test was used to determine within-group differences between pre- and post-intervention values, and the independent-samples t-test was used to determine between-group differences in post-intervention values. A two-tailed p-value of less than 0.001 was considered very statistically significant.

Within-Group Comparison — Group A

Table 1. Comparison of Pre-Test and Post-Test Values for Group A (Trigger Release on Pes Anserinus with Exercise, n = 13)

Outcome Measure	Time Point	Mean	SD	t-value	p-value
NPRS (0–10)	Pre-test	7.7	0.95	31.54	< 0.0001*
	Post-test	3.2	1.2		
ROM (degrees)	Pre-test	117.3	8.8	10.75	< 0.0001*
	Post-test	133.9	4.6		
LEFS (0–80)	Pre-test	56.9	7.3	12.612	< 0.0001*
	Post-test	70	5.2		

**p < 0.05, statistically significant (paired t-test)*



Graph - 1: Comparison of pre-test & post-test values for Group

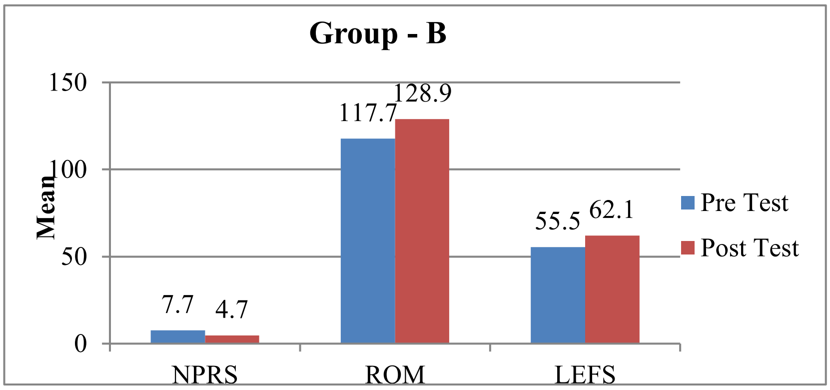
In Group A, mean NPRS decreased from 7.7 (± 0.95) to 3.2 (± 1.2) ($t = 31.54$, $p < 0.0001$); mean ROM increased from 117.3° (± 8.8) at baseline to 133.9° (± 4.6) post-intervention ($t = 10.75$, $p < 0.0001$); and mean LEFS increased from 56.9 (± 7.3) to 70 (± 5.2) ($t = 12.612$, $p < 0.0001$). All three within-group changes were statistically significant.

Within-Group Comparison — Group B

Table 2. Comparison of Pre-Test and Post-Test Values for Group B (Conventional Therapy: TENS with Knee Exercises, n = 13)

Outcome Measure	Time Point	Mean	SD	t-value	p-value
NPRS (0–10)	Pre-test	7.7	0.95	18.735	< 0.0001*
	Post-test	4.7	1.03		
ROM (degrees)	Pre-test	117.7	6.7	18.341	< 0.0001*
	Post-test	128.9	6.5		
LEFS (0–80)	Pre-test	55.5	9.6	5.701	< 0.0001*
	Post-test	62.1	7.96		

**p < 0.05, statistically significant (paired t-test).*



Graph - 2: Comparison of pre-test & post-test values for Group B

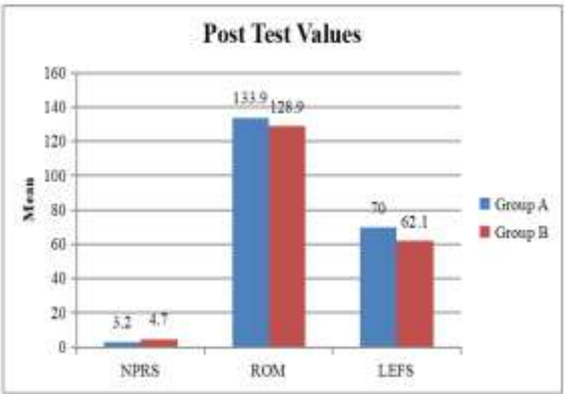
In Group B, mean NPRS decreased from 7.7 (± 0.95) to 4.7 (± 1.03) (t = 18.735, $p < 0.0001$); mean ROM increased from 117.7° (± 6.7) at baseline to 128.9° (± 6.5) post-intervention (t = 18.341, $p < 0.0001$); and mean LEFS increased from 55.5 (± 9.6) to 62.1 (± 7.96) (t = 5.701, $p < 0.0001$). All three within-group changes were statistically significant.

Between-Group Comparison

Table 3. Comparison of Post-Test Values Between Group A and Group B

Outcome Measure	Group A (Mean ± SD)	Group B (Mean ± SD)	t-value	p-value
NPRS (0–10)	3.2 ± 1.2	4.7 ± 1.03	3.482	0.0019*
ROM (degrees)	133.9 ± 4.6	128.9 ± 6.5	2.257	0.0334*
LEFS (0–80)	70 ± 5.2	62.1 ± 7.96	3.0099	0.0061*

*p < 0.05, statistically significant (independent-samples t-test). SD = standard deviation;



Graph- 3: Post Test Values of Group A & Group

Independent-samples t-test comparison of post-intervention values showed a statistically significant difference between Group A and Group B for all three outcome measures, with Group A demonstrating greater improvement than Group B: NPRS ($t = 3.482$, $p = 0.0019$), ROM ($t = 2.257$, $p = 0.0334$), and LEFS ($t = 3.0099$, $p = 0.0061$). Collectively, these findings indicate that both interventions produced statistically significant within-group improvement across all outcome measures, and that the magnitude of post-intervention improvement was significantly greater in Group A than in Group B.

RESULTS

Data were analysed in SPSS version 24 using the paired t-test (within-group) and independent-samples t-test (between-group), following normality testing with the Shapiro–Wilk test; significance was set at $p < 0.05$. Both groups showed highly significant within-group improvement across all outcomes ($p < 0.0001$). In Group A, mean NPRS improved from 7.7 (± 0.95) to 3.2 (± 1.2) ($t = 31.54$), ROM improved from 117.3° (± 8.8) to 133.9° (± 4.6) ($t = 10.75$), and LEFS improved from 56.9 (± 7.3) to 70 (± 5.2) ($t = 12.612$). In Group B, mean NPRS improved from 7.7 (± 0.95) to 4.7 (± 1.03) ($t = 18.735$), ROM improved from 117.7° (± 6.7) to 128.9° (± 6.5) ($t = 18.341$), and LEFS improved from 55.5 (± 9.6) to 62.1 (± 7.96) ($t = 5.701$). Post-intervention between-group comparison showed a statistically significant difference favouring Group A for NPRS ($t = 3.482$, $p = 0.0019$), ROM ($t = 2.257$, $p = 0.0334$), and LEFS ($t = 3.0099$, $p = 0.0061$).

DISCUSSION

This study compared trigger release on the pes anserinus combined with exercise against conventional TENS-based therapy on pain, knee ROM, and functional activity in 26 patients with knee osteoarthritis. Both groups demonstrated highly significant within-group improvement across all three outcome measures ($p < 0.0001$), and the independent-samples t-test comparison demonstrated a statistically significant post-intervention advantage for Group A across NPRS ($p = 0.0019$), ROM ($p = 0.0334$), and LEFS ($p = 0.0061$).

Both interventions produced a substantial reduction in NPRS scores, with Group A showing a numerically and statistically greater reduction (7.7 to 3.2, $t = 31.54$) than Group B (7.7 to 4.7, $t = 18.735$). A plausible explanation, consistent with the myofascial pain literature in knee OA, is that periarticular trigger points at sites such as the pes anserinus act as an additional, mechanically addressable source of nociceptive input; [3,5] direct release of this tissue may therefore contribute an incremental analgesic effect beyond that achieved with TENS and exercise alone. Corresponding gains were observed in ROM (Group A: 117.3° to 133.9°; Group B: 117.7° to 128.9°) and in functional activity as measured by the LEFS (Group A: 56.9 to 70; Group B: 55.5 to 62.1), consistent with pain relief and reduced soft-tissue restriction facilitating greater movement tolerance and, in turn, functional performance. These mechanistic explanations remain inferential, as the study did not include direct neurophysiological or imaging-based outcome measures.

The statistically significant between-group advantage favouring Group A across all three outcome measures suggests that trigger release on the pes anserinus offers additional benefit over conventional TENS-based therapy within the four-week period studied. Trigger release techniques are generally proposed to act by mechanically reducing taut-band tension and local hypersensitivity, potentially normalising regional blood flow and reducing peripheral nociceptive drive.[4] Given the documented anatomical and clinical relationship between the pes anserinus and knee OA severity, direct soft-tissue treatment at this site is biologically plausible as a contributor to the superior outcomes observed in Group A, although this remains a proposed rather than directly demonstrated mechanism.

The direction of these findings is consistent with existing literature indicating that myofascial trigger point contributes to pain in knee OA and Moraska etal., Sanchez- Romero etal, MA Y T etal, suggests that trigger-point-directed techniques, including release massage and dry needling, produce measurable improvements in pain and function in musculoskeletal populations. The findings for Group B are also consistent with the broader, mixed evidence base for TENS in knee OA: Reichenbach S etal (2022) states, while TENS is widely used clinically for pain relief, large placebo-controlled trials have not consistently demonstrated benefit beyond exercise and education alone. The comparative advantage of trigger release observed here should be interpreted against this wider and still-evolving evidence base, and warrants confirmation in larger, independently replicated trials.

CONCLUSION

This study compared trigger release on the pes anserinus combined with exercise against conventional TENS-based therapy in 26 patients with knee osteoarthritis. Both interventions produced highly significant within-group improvements in pain intensity, knee ROM, and functional activity over four weeks ($p < 0.0001$ for all comparisons). Independent-samples t-test comparison of post-intervention values demonstrated a statistically significant advantage for trigger release on the pes anserinus over conventional therapy across all three outcome measures (NPRS, $p = 0.0019$; ROM, $p = 0.0334$; LEFS, $p = 0.0061$), supporting adoption of the alternative hypothesis. Within the limitations of the study, these findings suggest that trigger release on the pes anserinus may offer a beneficial adjunct to conventional physiotherapy management of knee osteoarthritis; however, this conclusion is offered cautiously pending confirmation through further methodologically robust research.

REFERENCE

1. Cui A, Li H, Wang D, Zhong J, Chen Y, Lu H. Global, regional prevalence, incidence and risk factors of knee osteoarthritis in population-based studies. EClinicalMedicine. 2020;29-30:100587.

2. Curtis BR, Huang BK, Pathria MN, Resnick DL, Smitaman E. Pes anserinus: anatomy and pathology of native and harvested tendons. AJR Am J Roentgenol. 2019.
3. Dor A, Kalichman L. A myofascial component of pain in knee osteoarthritis. J Bodyw Mov Ther. 2017;21(3):642-7.
4. Moraska AF, Schmiege SJ, Mann JD, Butryn N, Krutsch JP. Responsiveness of myofascial trigger points to single and multiple trigger point release massages: a randomized, placebo controlled trial. Am J Phys Med Rehabil. 2017;96(9):639-45.
5. Sánchez-Romero EA, Pecos-Martín D, Calvo-Lobo C, García-Jiménez D, Ochoa-Sáez V, Burgos-Caballero V, Fernández-Carnero J. Clinical features and myofascial pain syndrome in older adults with knee osteoarthritis by sex and age distribution: a cross-sectional study. Knee. 2019;26(1):165-73.
6. Ma YT, Dong YL, Wang B, Xie WP, Huang QM, Zheng YJ. Dry needling on latent and active myofascial trigger points versus oral diclofenac in patients with knee osteoarthritis: a randomized controlled trial. BMC Musculoskelet Disord. 2023;24(1):36.
7. Reichenbach S, Jüni P, Hincapié CA, Schneider C, Meli DN, Schürch R, Streit S, Lucas C, Mebes C, Rutjes AWS, et al. Effect of transcutaneous electrical nerve stimulation (TENS) on knee pain and physical function in patients with symptomatic knee osteoarthritis: the ETRELKA randomized clinical trial. Osterthritis Cartilage. 2022;30(3):426-35.
8. Binkley JM, Stratford PW, Lott SA, Riddle DL. The Lower Extremity Functional Scale (LEFS): scale development, measurement properties, and clinical application. North American Orthopaedic Rehabilitation Research Network. Phys Ther. 1999;79(4):371-83.