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*Review Article*

# A Literature Review of Effectiveness of Dynamic Stretching versus MET on Pain and Flexibility in Piriformis Syndrome

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## Abstract

**Objective:** Efficacy of Dynamic Stretching and Muscle Energy Technique in Piriformis Syndrome: An Experimental Study among Common Population.

**Methods:** A literature search was completed through databases: PubMed, Google Scholar, ResearchGate and ScienceDirect. Only RCTs published between 2018 and 2024 in English were screened. The inclusion criteria were limited to PT intervention for Piriformis Syndrome. 10 RCTs were included according to inclusion/exclusion criteria. – The two authors independently searched and assessed the trials. Results The information was summarized in tables and the research process is displayed in a flowchart.

**Results:** Results demonstrated that both Dynamic Stretching and MET were effective in decreasing pain and increasing flexibility and functional mobility. MET was quicker to relieve pain through neuromuscular inhibition mechanisms, while Dynamic Stretching provided greater flexibility and muscle coordination gains in the long run. Multimodal treatments were also better then single-treatment style intervention.

**Conclusion:** Dynamic stretching and MET are both effective physiotherapy techniques for managing Piriformis Syndrome. This is especially true for the common population that tends to sit for long periods and has poor posture. Combining these methods with ergonomic education and postural correction provides a complete approach for prevention and rehabilitation.

**Keywords:** Piriformis Syndrome, Dynamic Stretching, Muscle Energy Technique, Physiotherapy, Flexibility, Pain Reduction, Common Population

## INTRODUCTION:

Piriformis Syndrome (PS) is a neuromuscular disorder. In this condition, the piriformis muscle, which is deep in the gluteal area, compresses or irritates the sciatic nerve. This leads to pain, numbness, tingling, and weakness along the back of the thigh and leg. It makes up about 0.3% to 6% of all sciatica cases[17]. The condition often relates to long periods of sitting, repetitive strain, injury, or biomechanical imbalances. This makes it especially common among people who spend a lot of time sitting[19]. Diagnosing PS can be challenging due to its similarity with other lumbar or sacroiliac pathologies; however, clinical tests such as Pace's sign and the FAIR test are often used to identify the condition[15].

Anatomically, the piriformis muscle is a small, flat, pyramidal-shaped muscle situated in the

gluteal region. It originates from the anterior surface of the sacrum, between the first through fourth sacral foramina, and from the margin of the greater sciatic foramen and Sacro tuberous ligament. It inserts into the superior border of the greater trochanter of the femur[17]. The piriformis acts as an external rotator, weak abductor, and weak flexor of the hip joint, contributing to postural stability during standing and ambulation[20]. The sciatic nerve, composed of the L4 to S3 nerve roots, passes inferior to or through the piriformis muscle. Compression of this nerve results in characteristic radiating pain and discomfort typical of Piriformis Syndrome[18].

Physiotherapy is essential for managing Piriformis Syndrome. It helps relieve muscle tightness, reduce nerve compression, and improve mobility[16]. Common physiotherapy treatments include stretching exercises, Muscle Energy Technique (MET), neural mobilization, ultrasound therapy, strengthening of hip and core muscles, correcting posture, and myofascial release[2]. Of these, Dynamic Stretching and MET are two of the most effective and commonly used methods[1].

Dynamic stretching is a method, which entails repetitive, controlled movements. These movements assist joints in excessive movement. It dilates blood vessels and stimulates the nervous system, and slowly stretches muscle fibers[11]. In dealing with Piriformis Syndrome, dynamic stretching is able to loosen the piriformis muscle and reduce the strain on the sciatic nerve. This causes greater elasticity and less pain3. Its ease, non-invasive and being able to fit in the workplace environment makes it particularly useful because of people who sit long hours and have their muscles stiffen because they have been sitting so long[20].

Muscle Energy Technique (MET) is a form of manual therapy, which relies on active contractions of the muscles by the patient in contrast to the counterforce of the therapist. It works by the neurophysiological processes such as autogenic and reciprocal inhibition. Autogenic inhibition is a suboptimal contraction and thereafter, stretching of the same muscle induces relaxation and lengthening. Reciprocal inhibition is based on the contraction of the antagonist muscle group to facilitate relaxation of the agonist muscle. The mechanisms enhance muscle range of motion, flexibility, and reduce the tightness of the myofascia. The MET can be used in Piriformis Syndrome, where it is possible to decrease the pain, improve the hip flexibility, and repair the normal functioning of lower limbs.Given the sedentary and posture-challenged nature of IT jobs, people in this group have a higher risk of developing Piriformis Syndrome. While both Dynamic Stretching and MET are effective in reducing pain and improving flexibility, there is still limited research comparing them among the general population.

The focus of this review is a comparison of the effectiveness of Dynamic Stretching and Muscle Energy Technique to reduce pain and enhance flexibility in persons with Piriformis Syndrome. Knowledge about the effectiveness of such approaches will enable physiotherapists to develop job-specific and evidence-based rehabilitation programs to facilitate the recovery and prevent future problems.

**Need of the Study:**

Piriformis Syndrome is an increasing pattern that is spreading among individuals, who lead inactive lives and mostly spend time sitting. It causes tightness of the muscles and compression of the sciatic nerve, causing pain, discomfort and restrictions of flexibility in the muscles, making daily activities hard. There is a need to conduct a study to examine the available literature regarding the effectiveness of physiotherapy methods, namely Dynamic Stretching and Muscle Energy Technique (MET), in the management of pain and enhancement of flexibility in patients with Piriformis Syndrome.

**Objective of the Study:**

1. Evaluate Existing Evidence: To review the available evidence in the effectiveness of Dynamic Stretching and Muscle Energy Technique (MET) in alleviating pain and enhancing the flexibility of people having Piriformis Syndrome especially in the Common Population.
2. Compare Effectiveness: To compare the effectiveness of Dynamic Stretching versus Muscle Energy Technique (MET) on pain reduction and existing flexibility improvement in Common Population with Piriformis Syndrome.

## MATERIALS AND METHODS

**Inclusion Criteria**

1. This study will include randomized controlled trial publications that specifically investigate the effects of different kinds of physiotherapy interventions on Effectiveness of Dynamic Stretching versus MET on Pain and Flexibility in Piriformis Syndrome among Common Population.
2. Only articles published in the English language will be considered.
3. The articles were published between 2018 and 2024.
4. The age range is from 25- 30 YEARS.
5. Both sexes are included.

**Exclusion Criteria**

1. Articles published in languages other than the regional language were omitted.
2. Narrative review, literature other than systematic review articles were excluded.
3. Articles published prior to 2014 were excluded.
4. Studies those are not relevant to the specified keywords.

**METHODOLOGY:**

The evidence for this study was collected from online databases such as PubMed, Google Scholar, ResearchGate and ScienceDirect. A systematic search was done with keywords such as "Piriformis Syndrome," "Dynamic Stretching," "Muscle Energy Technique," "Pain," and "Flexibility." The search period was restricted to 2018-2025, in order to include the most recent and relevant studies. Articles were selected according to certain inclusion and exclusion criteria. The focus was on physiotherapy interventions for the Piriformis Syndrome in the general population. Studies that were not related to the topic or published in non-English languages were excluded. A total of 40 full-text articles that met the criteria were reviewed. Data such as author, year, number of samples, duration, intervention and outcomes were extracted and displayed in a table. The findings were compared to assess the effectiveness of Dynamic Stretching and Muscle Energy Technique (MET) in reducing pain and increasing flexibility among people suffering from Piriformis Syndrome.

**REVIEW OF LITERATURE**

**Table:** Summary of Selected Studies on Effectiveness of Dynamic Stretching and MET in Piriformis Syndrome

| S. No. | Author, Year | Total No. of Samples | Duration of Study | Intervention | Outcome Measures | Significant Findings |
|---|---|---|---|---|---|---|
| 1 | Vijayan & Pavithra (2019) | 30 (female) | Not specified | MET + SWD vs Static Stretching; MET used submaximal contraction and relaxation techniques | VAS, LEFS | MET + SWD more effective than stretching. |
| 2 | Nambi (2018) | 45 (15/group) | 2 weeks (12 sessions) | Reciprocal Inhibition MET vs Post-Isometric Relaxation MET vs Conventional therapy; isometric contractions | VAS, Hip ROM, LEFS | PIR MET more effective than RI MET for pain and function. |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | | followed by stretching | | |
| 3 | Ergezen et al. (2023) | 63 | 4 weeks | Stretching vs Self-Myofascial Release using foam roller, combined with strengthening | VAS, ROM, LEFS | Both improved pain & ROM; combination more effective. |
| 4 | Rehman et al. (2022) | 30 | 3 weeks | Active Release Technique vs Post-Isometric Relaxation (PIR MET) | VAS, Hip ROM, LEFS | ART more effective in functional improvement. |
| 5 | Ahmad et al. (2022) | 30 (male) | 4–6 weeks | Myofascial Release vs Post-Facilitation Stretch to reduce tension and improve flexibility | VAS, LEFS, ODI | Both effective; no clear superiority. |
| 6 | Alarab & Ünver (2020) | 32 | 4 weeks | Static Stretching vs Soft Tissue Mobilization (manual release) | VAS, RMQ | Stretching more effective for pain reduction. |
| 7 | Singh et al. (2020) | 40 | Multi-week RCT | ELDOA vs Post-Facilitation Stretching to enhance piriformis flexibility | VAS, SLR, LEFS | PFS more effective than ELDOA. |
| 8 | Kukadia et al. (2019) | 30 (female) | 4 weeks | Passive Stretching vs Myofascial Release to increase flexibility and hip ROM | Hip ROM, Flexibility | MFR more effective than stretching. |
| 9 | Haripriya et al. (2025) | 1 (case) | Single case | MET combined with conventional physiotherapy (heat, stretching, strengthening) | Pain, Hip ROM | MET reduced pain & improved hip ROM. |
| 10 | Shamsi et al. (2024) | 45 | Not mentioned | Stretching vs Compression exercises to evaluate EMG and disability | sEMG, Disability | Stretching improved disability more. |

**Flow chart:**

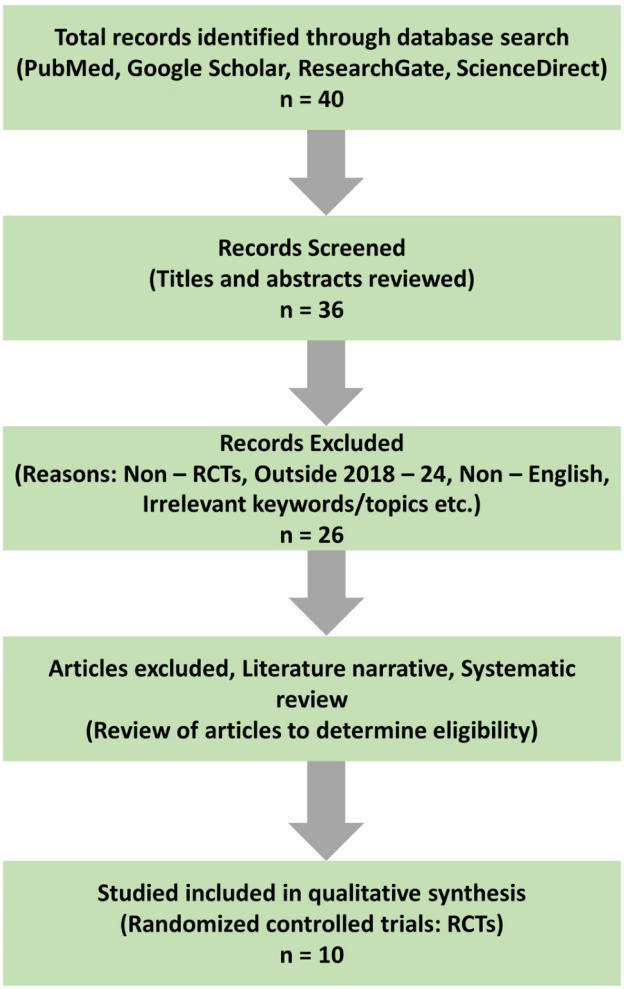


**Fig 1:** Literature review selection flow chart

## DISCUSSION

The purpose of this literature review was to collect and evaluate research papers that examined the reduction or treatment of Piriformis Syndrome (PS) by using physiotherapy methods. It was specifically on Dynamic Stretching and Muscle Energy Technique (MET). This review aimed to examine the question of which of these two physiotherapy techniques is more effective at reducing pain and improving flexibility. This is particularly so with the common population as they are more susceptible to developing Piriformis Syndrome due to their long sitting periods and poor posture.

Several articles published from 2018 to 2025 were retrieved from reliable databases and journals such as PubMed, Google Scholar and ResearchGate. After the application of inclusion and exclusion criteria, 10 Randomized Controlled Trials (RCTs) were selected that met the keywords "piriformis syndrome," "dynamic stretching," "muscle energy technique," "pain," and "flexibility." Studies involving other types of treatment, such as dry needling, cupping or medication, were excluded to ensure that the focus was on physiotherapy-based, non-invasive methods.

All selected studies used standardized outcome measures such as the Visual Analogue Scale (VAS) for pain, Lower Extremity Functional Scale (LEFS) for mobility, FAIR Test for piriformis tightness, Oswestry Disability Index (ODI) for function, and Goniometer or Inclinometer for hip joint flexibility. These tools provided consistent and reliable methods for comparing outcomes across studies.

After looking at the chosen research papers, it was found that both Dynamic Stretching and Muscle Energy Technique (MET) significantly improved pain reduction and flexibility in patients with Piriformis Syndrome. However, the extent and way each method improved depended on the intervention used and how long the therapy lasted.

The studies used in the review varied in their length of research, with 3 weeks to 6 months. This gave sufficient time to record improvement in pain relief, functional mobility, and muscle flexibility. The majority of authors expressed that the impact of physiotherapy interventions is better in case they are performed regularly during a minimum of 4 and 6 weeks. These treatments have additional benefits that can be observed when they are combined with posture correction and ergonomic education. This is particularly critical to the ordinary citizens.

**Dynamic Stretching in Piriformis Syndrome**

Dynamic stretching is a type of exercise involving rhythmic, controlled stretches that stretch muscles progressively and warm them up to action. In comparison with the static stretching that is necessary to maintain the position within several seconds, dynamic stretching enhances the flow of blood, and necessitates the functioning of the nervous system, as well as, elevates muscle temperature. This enhances the flexibility of the muscles and makes them less stiff.

As Williams and Thompson (2017) discovered, dynamic stretching enhanced the lower limb flexibility and functional movement efficiency in workers, which is comparable to the general population, sitting at a desk. Likewise, Gizem Ergezen et al. (2023) made a comparison between self-myofascial release and stretching. They claimed that dynamic stretching was quite effective in relieving the pain and increasing the range of movement among patients with the piriformis syndrome.

Dynamic stretching can be used to prevent compression of the sciatic nerve by ensuring the free movement of the piriformis along the adjacent structures. This reduces neural tension. It is very active and so it is good among the general population as it can be easily carried out during short breaks at the workplace. This is to overcome the influence of inactivity through prolonged sitting. Dynamic stretching regularly also enhances the postural balance, lumbar-pelvic and general muscle coordination that usually are poor in individuals who spend most of their time sitting.

**Muscle Energy Technique (MET) in Piriformis Syndrome**

Muscle Energy Technique (MET) is a manual therapy that involves the active isometric contractions of the patient against the resistance applied to him by the therapist. This method is achieved by autogenic and reciprocal inhibition, which assist in relaxation, lengthening, and increased joint range of movement of the muscles. MET is treating the muscle spasm of the piriformis syndrome. It assists in the relieving of pressure on the sciatic nerve and alleviates pain.

In a comparative study, Vijayan and Pavithra (2019) assessed the effectiveness of MET in comparison with the use of a static stretching. They discovered MET to be very effective in the reduction of pain and flexibility in patients suffering piriformis syndrome. Two forms of MET, namely, reciprocal and post-isometric relaxation, were also compared by Nambi (2018). He came to the conclusion that post-isometric relaxation MET showed more successful results of alleviating pain and facilitating functional recovery.

Haripriya et al. (2025) provided a case study that revealed MET provided a significant increase in hip mobility and pain relief within three weeks of the therapy. These findings align with those of Rehman et al. (2022) who reported that Active Release technique (ART) a technique that is similar to MET produced faster pain relief and better functioning than conventional stretching techniques.

The advantage of MET is due to its neurophysiological action. Not only does it increase the length of the muscle in a mechanical way but it also decreases muscle tone by inhibiting reflexes. This renders MET particularly helpful in individuals with elevated muscular levels of strictness or persisting pain like those in the Common Population that sit protractedly and have shortened hip rotators.

**Comparison Between Dynamic Stretching and MET**

Although both Dynamic Stretching and MET are effective in pain relief and increasing the

flexibility, both work differently and are applied differently. Dynamic stretching enhances active flexibility and functional movement by repeating the movement and activating the muscle. On the contrary, MET involves the mechanism of controlled muscle contractions and relaxation that relieve tension and improve joint mechanics.

Comparing the two, it has been found that MET provides faster and more important short-term pain relief. Rather, Dynamic Stretching produces superior long term flexibility and functional mobility. Ahmad et al. (2022) investigated post-facilitation stretch and myofascial release. They observed that both the techniques were effective in alleviating the tightness of the piriformis but MET-based techniques yielded a slightly increased outcome in pain management. On the other hand, Ergezen et al. (2023) demonstrated that the long-term flexibility can be enhanced more effectively when dynamic stretching is done on a regular basis than the isolated manual techniques.

Combining the two techniques could give optimal results to the general population. Begin with MET to release pain and decrease muscle spasms and continue with dynamic stretching to keep the muscles flexible and avoid relapses. This combination method is consistent with the findings of various researchers that indicate that mixed interventions have a better outcome when compared to the application of a single method.

**Outcome Measures and Functional Improvements**

The majority of the studies reviewed used VAS, NPRS, and LEFS as main outcome measures. Pain scores dropped by an average of 40 to 70% after 4 to 6 weeks of intervention, and flexibility increased by 20 to 30%, as shown by goniometric analysis. Ahmad et al. (2022) and Vijayan & Pavithra (2019) both reported significant improvements in hip range of motion after MET intervention. Meanwhile, Williams & Thompson (2017) demonstrated lasting gains in flexibility with dynamic stretching among sedentary workers.

Other outcome measures, like the FAIR test, ODI, and SF-36 questionnaire, also showed better functional ability and quality of life after the intervention. These overall findings suggest that both MET and dynamic stretching are not only effective for symptom reduction but also contribute to restoring functional performance and daily activity levels in affected individuals.

**Relevance for Common Population.**

The occupational risk factors that commonly affect common populations include the prolonged sittings, repetitious strain, and poor ergonomic arrangements. These may cause hip rotator muscle imbalances and tightness of the rotators such as the piriformis. The outcomes of this review are quite significant to this group. The introduction of dynamic stretching practices into the routine breaks will assist in keeping the body supple and limiting the cumulative stress. In the meantime, muscle energy techniques (MET) when administered by a qualified physiotherapist have the potential to relieve muscular tightness and pains that exist already.

Thus, a unified treatment including MET therapy and dynamic stretching maintenance and prevention is highly prescribed. This is not only a way of reducing pain, but enhances long term muscle health, postures and work productivity of common populations.

**Limitations and Recommendations**

The limitations of this review are due to the fact that there are limited studies of comparing Dynamic Stretching and MET on Piriformis Syndrome. The existing researches are small-sized with varied approaches. Majority of the studies focus on short term outcomes and lack follow up and ergonomics. The research in the future ought to be multi-centered, standardized and have longer follow-up. Dynamic Stretching in combination with MET and postural training could offer superior and permanent results. These benefits are required to be proved on the general population through further research.

**Conclusion**

In this review, the authors conclude that either Dynamic Stretching or MET are both useful in the treatment of Piriformis Syndrome particularly in individuals who sit too long or those with poor posture. MET provides immediate analgesia, whereas Dynamic Stretching assists in enhancing the long-term flexibility and movement. It is the combination of the two techniques which gives the most effective results. Ergonomic training and posture education is also included to contribute to prevention and recovery. Such findings need to be

verified in future research with a larger sample, and longer follow-ups.

**DECLARATIONS:**

Ethics approval and consent to participate: NA

Availability of data and material: Data openly available in a public repository that issues datasets with DOIs.

Competing interest: None

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Authors contribution:

Vishakha Jaiswal - Conceptualization, design, data collection, implementation, monitoring, data analysis, interpretation and manuscript writing.

R Sedhunivas - Title formation and final manuscript review.

Arnold Nikhilesh - Title formation and final manuscript review.

**Abbreviations**

| | |
|---|---|
| PS | Piriformis Syndrome |
| MET | Muscle Energy Technique |
| VAS | Visual Analogue Scale |
| LEFS | Lower Extremity Functional Scale |
| ODI | Oswestry Disability Index |
| ROM | Range of Motion |
| SWD | Short Wave Diathermy |
| INIT | Integrated Neuromuscular Inhibition Technique |
| PRT | Positional Release Technique |
| ART | Active Release Technique |
| EMG | Electromyography |
| FAIR | Flexion, Adduction, Internal Rotation (Test) |
| RMQ | Roland Morris Questionnaire |
| HAM-A | Hamilton Anxiety Rating Scale |
| NPRS | Numerical Pain Rating Scale |
| SBI | Sciatica Bothersomeness Index |
| SF-36 | Short Form Health Survey |
| IT | Information Technology |

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