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# A Pilot Study Examining Two Interventions for Gluteal Pain: Stretching and Positional Release Therapy

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**Abstract:** ***To compare stretching exercises and positional release technique (PRT) for reducing pain severity and improving functional ability among individuals with gluteal pain syndrome. In this pilot study, 18 participants (42% male, 58% female; mean age 44.9 ± 4.6 years) were randomly assigned to stretching (n = 9) or PRT (n = 9). Both interventions were delivered three times weekly for four weeks. Pain was measured using the Visual Analog Scale (VAS), and functional disability was assessed using the Roland-Morris Disability Questionnaire (RMQ), before and after treatment. Both interventions improved pain and function. In the stretching group, VAS scores decreased from 7.8 ± 0.89 to 4.2 ± 0.74 (p = 0.002), and RMQ scores decreased from 19.24 ± 5.7 to 14.22 ± 6.3 (p = 0.001). In the PRT group, VAS scores decreased from 8.4 ± 2.76 to 3.03 ± 3.07 (p = 0.001), and RMQ scores decreased from 20.1 ± 7.04 to 11.4 ± 9.42 (reported p = 0.001). Between-group comparisons favored PRT (p < 0.05). The small pilot sample and absence of long-term follow-up limit generalizability and do not establish the durability of treatment effects. PRT may be considered alongside stretching in rehabilitation plans for gluteal pain, while larger controlled studies are needed before firm treatment recommendations can be made. The study provides a preliminary direct comparison of stretching and PRT for gluteal pain syndrome in a Palestinian sample.***

***Keywords: Gluteal Pain; Pain Management; Positional Release Technique; Stretching Exercises.***

## 1. Introduction

Gluteal pain syndrome represents a common musculoskeletal disorder affecting approximately 20-30% of the general population at some point in their lives [1]. This condition, often incorrectly termed "piriformis syndrome," encompasses a spectrum of pathologies affecting the gluteal region, including myofascial pain, tendinopathies, and nerve entrapments [2]. Patients typically present with localized buttock discomfort that may radiate to the posterior thigh, significantly impairing daily activities such as sitting, walking, and climbing stairs [3].

The pathogenesis of gluteal pain syndrome involves complex interactions between muscular dysfunction, fascial restrictions, and potential neural compression. The gluteal musculature comprising the gluteus maximus, medius, minimus, and deep external rotators including the piriformis plays essential roles in hip stabilization, pelvic control, and lower extremity biomechanics [4]. When these muscles become tight, weak, or develop trigger points, they can generate referred pain patterns and functional limitations characteristic of this syndrome [5].

Conservative management remains the cornerstone of treatment for gluteal pain syndrome, with physical therapy interventions being particularly prominent [6]. Among available therapeutic options, stretching exercises have traditionally been employed to address muscle tightness, improve flexibility, and restore normal movement patterns [7]. These exercises target specific musculature through controlled elongation, theoretically reducing tension on nerves and decreasing pain perception [8]. Common stretching protocols for gluteal pain include the piriformis stretch, figure-four stretch, and pigeon pose variations [9].

More recently, manual therapy approaches have gained attention in managing musculoskeletal pain conditions. Positional release technique (PRT), a form of indirect osteopathic manipulative treatment, involves positioning the patient to achieve maximum comfort and tissue relaxation in dysfunctional areas [10]. This technique is based on the principle that placing tissues in a position of ease reduces inappropriate proprioceptive activity, allowing for normalization of muscle tone and resolution of tender points [11]. PRT offers the theoretical advantage of providing rapid pain relief without the discomfort sometimes associated with direct stretching or deep pressure [12].

Despite the widespread clinical use of both stretching exercises and PRT, limited comparative evidence exists regarding their relative effectiveness for gluteal pain syndrome. Previous investigations have examined these interventions individually or in heterogeneous populations, yielding inconclusive results regarding optimal treatment selection [13]. Healthcare providers therefore face uncertainty when choosing between these approaches for their patients, potentially leading to suboptimal outcomes and prolonged recovery periods.

The present study addresses this knowledge gap by directly comparing stretching exercises and PRT in a homogeneous sample of individuals with gluteal pain syndrome. The primary objectives were to: [1] evaluate the effectiveness of stretching exercises in reducing pain

severity and improving functional ability; [2] assess the effectiveness of PRT in reducing pain severity and improving functional ability; and [3] compare the relative impact of these interventions on clinical outcomes. We hypothesized that both treatments would produce significant improvements, with potential differences in magnitude of effect between approaches.

## 2. Materials and Methods

### 2.1 Study Design

This pilot study employed a two-group pretest-posttest design to compare the effectiveness of stretching exercises versus positional release technique in individuals with gluteal pain syndrome. The study was conducted over a four-month period from September to December 2023 across multiple physical therapy centers in the Bethlehem region, Palestine.

### 2.2 Participants

Eighteen individuals with gluteal pain syndrome participated in this study. Participants were recruited through public advertisements and referrals from local healthcare providers. The sample size was determined based on feasibility considerations for this pilot comparative study, with nine participants allocated to each intervention group.

Inclusion criteria comprised: [1] age between 20 and 55 years; [2] presence of gluteal region pain for at least three months; [3] current gluteal pain with potential referral to the thigh or lower limb; and [4] willingness to participate in the four-week intervention protocol. Exclusion criteria included: [1] history of vertebral fracture; [2] previous spinal surgery; [3] spinal tuberculosis; [4] rheumatoid disease; and [5] diagnosed disc pathology requiring surgical intervention.

The study protocol was approved by the institutional review board of Palestine Ahliya University. All participants provided written informed consent prior to enrollment, with forms available in both Arabic to ensure comprehension. Participants were informed of their right to withdraw at any time without consequences, and all data were anonymized to protect confidentiality.

### 2.3 Randomization and Group Allocation

Eligible participants were randomly assigned to one of two intervention groups using a computer-generated randomization sequence. Group A (n=9) received stretching exercises, while Group B (n=9) underwent positional release technique. The randomization process was concealed from outcome assessors to minimize detection bias.

### 2.4 Outcome Measures

Two primary outcome measures were employed to assess treatment effectiveness. Pain intensity was evaluated using the Visual Analog Scale (VAS), a 10-centimeter horizontal line anchored by "no pain" (0 cm) and "worst imaginable pain" (10 cm). Participants marked their current pain level, and the distance from zero was measured in centimeters. The VAS demonstrates excellent reliability and validity for assessing musculoskeletal pain intensity [7].

Functional disability was assessed using the Roland-Morris Disability Questionnaire (RMQ), a 24-item self-report measure specifically designed for individuals with back-related dysfunction. Each item describes a daily activity limited by pain (e.g., "I stay at home most of the time because of my back"), and participants endorse items applicable to their current state. Scores range from 0 (no disability) to 24 (severe disability), with higher scores indicating greater functional limitation. The RMQ has been extensively validated in musculoskeletal pain populations and demonstrates sensitivity to clinical change [10].

### 2.5 Diagnostic Confirmation

To ensure diagnostic accuracy, all participants underwent standardized clinical examination prior to enrollment. The Flexion-Adduction-Internal Rotation (FADIR) test was performed with participants in side-lying position; the examiner passively moved the hip into 90 degrees flexion, adduction, and internal rotation. Reproduction of pain in the sciatic or gluteal area constituted a positive test suggestive of gluteal pain syndrome [3].

The Straight Leg Raise (SLR) test was additionally performed to differentiate gluteal pain from lumbar radiculopathy. With participants supine, the examiner passively raised the extended leg until symptom reproduction. While classically associated with lumbar nerve root compression, pain reproduction in the buttock region during SLR may indicate piriformis involvement, particularly when combined with other positive findings [1].

### 2.6 Interventions

#### 2.6.1 Stretching Exercise Protocol

Participants in Group A received a standardized stretching program targeting the gluteal musculature. Exercises were performed three times weekly for four weeks under therapist supervision. The protocol included three specific stretches:

The supine figure-four stretch required participants to lie on their back, place one ankle over the opposite knee, and gently pull the leg toward the chest until a stretch sensation was perceived in the gluteal region. This position was held for 30 seconds and repeated four times bilaterally.

The seated chair stretch involved sitting upright in a sturdy chair, placing the right ankle on the left thigh just above the knee, and leaning forward with a straight back until gluteal stretch was achieved. The position was maintained for 30 seconds, repeated four times, and performed bilaterally.

The pigeon poses required participants to assume a quadruped position, bring one knee forward toward the ipsilateral wrist, and extend the opposite leg posteriorly. Participants then lowered their hips toward the floor while maintaining an upright torso, holding the stretch for 20 seconds before repeating bilaterally for four repetitions.

All stretches were performed within pain-free ranges, and participants were instructed to breathe normally throughout each hold.

#### 2.6.2 Positional Release Technique Protocol

Participants in Group B received PRT administered by trained physical therapists with experience in manual therapy techniques. The intervention followed standard strain-counterstrain principles for the gluteal region.

Therapists first palpated through the gluteus maximus and piriformis area to identify tender points associated with the patient's pain complaint.

Once tender points were localized, therapists passively moved the participant through various hip positions while continuously monitoring tissue tension at the identified point. The "position of ease"—defined as the position producing maximal symptomatic relief and tissue relaxation—was identified for each tender point. Participants were maintained in this position for 60 to 90 seconds, with monitoring for tissue relaxation and pain reduction. Following the hold period, therapists slowly returned the participant to neutral and applied gentle passive mobilization through hip external and internal rotation to reinforce the newly acquired tissue quality. This sequence was repeated three times per session, with sessions conducted three times weekly for four weeks.

**2.7 Data Collection Procedures**

Baseline demographic data including age, gender, and weight were collected for all participants. The FADIR and SLR tests were performed to confirm diagnosis and establish baseline clinical status. Pre-intervention outcome measures (VAS and RMQ) were administered immediately before the first treatment session.

Participants then underwent their assigned intervention three times weekly for four consecutive weeks, totaling 12 treatment sessions. All sessions were supervised by trained physical therapists who documented attendance and any adverse events. Post-intervention outcome measures were collected within three days following the final treatment session by assessors blinded to group allocation.

**2.8 Statistical Analysis**

Data were analyzed using SPSS version 24.0 (IBM Corp., Armonk, NY, USA) and Microsoft Excel. Descriptive statistics (means, standard deviations, frequencies, percentages) were calculated for all variables. Independent samples t-tests were used to compare demographic characteristics and baseline outcome measures between groups, ensuring initial comparability.

Within-group changes from pre- to post-intervention were analyzed using paired samples t-tests for both VAS and RMQ scores. Between-group comparisons of change scores (post-intervention minus pre-intervention) were performed using independent samples t-tests to determine relative effectiveness of the two interventions. Statistical significance was set at $p < 0.05$ for all analyses. Assumptions of normality were verified prior to parametric testing.

**3. Results**

**3.1 Participant Characteristics**

The study sample comprised 18 participants, with 9 randomly assigned to each intervention group. The overall demographic distribution included 42% male (n=8) and 58% female (n=10) participants. Group A (stretching exercises) demonstrated a mean age of 44.6 years (SD=4.1) and mean weight of 80.8 kg (SD=3.5). Group B (positional release technique) showed a mean age of 45.2 years (SD=5.01) and mean weight of 77.4 kg (SD=4.1). Independent samples t-tests revealed no significant differences between groups in age (p=0.13) or weight (p=0.32), confirming successful randomization and group comparability at baseline (Table 1).

Table 1: Comparison of Demographic Characteristics between Groups

| Variables | Group A (Stretching) Mean (SD) | Group B (PRT) Mean (SD) | P-value |
|---|---|---|---|
| Age (years) | 44.6 (4.1) | 45.2 (5.01) | 0.13 |
| Weight (kg) | 80.8 (3.5) | 77.4 (4.1) | 0.32 |

**3.2 Within-Group Effects of Stretching Exercises**

Analysis of Group A outcomes using paired samples t-tests demonstrated significant improvements following the four-week stretching intervention. Pain severity measured by VAS decreased substantially from a pre-treatment mean of 7.8 (SD=0.89) to a post-treatment mean of 4.2 (SD=0.74). This mean reduction of 3.6 points was statistically significant (t=9.3, p=0.002), indicating robust pain-relieving effects of the stretching protocol.

Functional disability assessed by RMQ showed parallel improvements, with scores decreasing from a pre-treatment mean of 19.24 (SD=5.7) to a post-treatment mean of 14.22 (SD=6.3). This mean reduction of 5.02 points was statistically significant (t=8.03, p=0.001), demonstrating meaningful improvement in participants' ability to perform daily activities following stretching exercises (Table 2).

Table 2: Comparison of Group A Sample Before and After Stretching Exercises

| Measure | Time Point | Mean | SD | t-value | p-value |
|---|---|---|---|---|---|
| VAS | Pre-treatment | 7.8 | .89 | .3 | .002 |
| | Post-treatment | 4.2 | .74 | | |
| RMQ | Pre-treatment | 19.24 | .7 | .03 | .001 |
| | Post-treatment | 14.22 | .3 | | |

**3.3 Within-Group Effects of Positional Release Technique**

Group B participants who received PRT similarly demonstrated significant improvements across both outcome measures. VAS scores decreased markedly from a pre-treatment mean of 8.4 (SD=2.76) to a post-treatment mean of 3.03 (SD=3.07), representing a mean reduction of 5.37 points (t=7.12, p=0.001). This substantial decrease indicates powerful analgesic effects of the PRT intervention.

Functional outcomes in Group B improved even more dramatically, with RMQ scores decreasing from a pre-treatment mean of 20.1 (SD=7.04) to a post-treatment mean of 11.4 (SD=9.42). This mean reduction of 8.7 points was highly significant (t=6.18, p=0.001), reflecting substantial enhancement in participants' functional capacity following four weeks of PRT (Table 3).

Table 3: Comparison of Group B Sample Before and After Positional Release Technique

| Measure | Time Point | Mean | SD | t-value | p-value |
|---|---|---|---|---|---|
| VAS | Pre-treatment | 8.4 | .76 | .12 | .001 |
| | Post-treatment | 3.03 | .07 | | |
| RMQ | Pre-treatment | 20.1 | .04 | 6.18 | 0.001 |
| | Post-treatment | 11.4 | 9.42 | | |

**3.4Comparative Effectiveness Between Interventions**

Between-group comparisons of change scores revealed differential treatment effects favoring PRT over stretching exercises. For pain outcomes, Group B demonstrated a significantly larger mean VAS reduction (-5.37 points, SD=0.77) compared to Group A (-3.6 points, SD=0.49), with the difference reaching statistical significance (p=0.001). This indicates that PRT produced approximately 49% greater pain reduction than stretching exercises.

Similarly, for functional outcomes, Group B showed a larger mean RMQ reduction (-8.7 points, SD=7.3) compared to Group A (-5.02 points, SD=8.9), representing a statistically significant difference (p=0.001). The PRT intervention produced approximately 73% greater improvement in functional disability compared to stretching exercises (Table 4).

Table 4: Comparison of Mean Changes Between Groups

| Measure | Group A (Stretching) Mean Difference (SD) | Group B (PRT) Mean Difference (SD) | P-value |
|---|---|---|---|
| VAS | -3.6 (0.49) | -5.37 (0.77) | 0.001 |
| RMQ | -5.02 (8.9) | -8.7 (7.3) | 0.001 |

Both interventions were well-tolerated with no reported adverse events or study withdrawals, indicating excellent safety profiles for both treatment approaches.

**4. Discussion**

This study compared the effectiveness of stretching exercises and positional release technique in managing gluteal pain syndrome, with findings demonstrating significant improvements following both interventions. Notably, PRT produced superior outcomes in reducing pain severity and enhancing functional capacity compared to stretching exercises alone. These results provide valuable evidence to guide clinical decision-making for this prevalent musculoskeletal condition.

The significant improvements observed following stretching exercises align with previous research supporting flexibility training for gluteal region pathologies. Kato et al. [8] demonstrated that systematic stretching protocols effectively reduce musculoskeletal pain by addressing muscle tightness and improving tissue extensibility. The 46% reduction in VAS scores observed in our stretching group parallels findings from Hatefi et al. [7], who reported comparable improvements in pain and disability following static stretching for low back pain patients. The mechanism underlying these benefits likely involves normalization of muscle length, reduction of myofascial trigger point activity, and improved neural dynamics through the gluteal region [9].

The even more pronounced improvements following PRT warrant particular attention. The 64% VAS reduction and 43% RMQ improvement in the PRT group represent clinically meaningful changes exceeding minimal detectable change thresholds for these instruments. These findings extend previous work by Sheikhi [10], who reported superior outcomes with manual therapy approaches compared to exercise alone for chronic low back pain. The strain-counterstrain mechanism proposed for PRT suggests that placing dysfunctional tissues in positions of maximal comfort may reset inappropriate proprioceptive activity, reduce nociceptive input, and facilitate normalization of muscle tone [11]. The 90-second hold period employed in this study aligns with recommendations for optimal tissue relaxation and tender point resolution [13].

The superior effectiveness of PRT compared to stretching exercises may be explained by several factors. First, PRT directly addresses the neurological component of musculoskeletal pain by targeting facilitated segments and reducing aberrant muscle spindle activity [3]. Second, the passive nature of PRT may be particularly beneficial for patients with acute pain who cannot tolerate active stretching. Third, PRT may produce more rapid changes in tissue texture and mobility compared to stretching, potentially accelerating recovery [12]. The greater functional improvements observed with PRT suggest that addressing neuromuscular control may be more critical than flexibility for restoring daily activity capacity.

These findings have important implications for clinical practice. For healthcare providers managing gluteal pain syndrome, PRT may be considered as a first-line intervention, particularly for patients presenting with moderate to severe pain. The technique's non-invasive nature, absence of reported adverse effects, and rapid onset of benefits make it an attractive option for busy clinical settings. However, stretching exercises remain a valuable component of comprehensive rehabilitation, particularly for maintaining gains achieved through manual therapy and addressing chronic flexibility deficits [5].

The present study possesses several methodological strengths, including randomized group allocation, blinded outcome assessment, standardized intervention protocols, and use of validated outcome measures. The homogeneous sample with clearly defined inclusion criteria enhances internal validity, while the pragmatic nature of interventions supports clinical applicability. Additionally, the absence of attrition and reported adverse events supports treatment acceptability.

Several limitations warrant consideration when interpreting these findings. The relatively small sample size (n=18) limits statistical power and generalizability, though significant between-group differences were nevertheless detected. The absence of long-term follow-up prevents assessment of durability of treatment effects beyond the immediate post-intervention period. The lack of a control group receiving no intervention or sham treatment means we cannot definitively attribute improvements to specific treatment effects versus natural history or nonspecific factors. Additionally, the single geographic location and specific cultural context

may limit applicability to diverse populations.

Future research should address these limitations through larger multicenter trials with extended follow-up periods. Investigation of potential mechanisms underlying PRT effectiveness, perhaps using ultrasound elastography or electromyography, would enhance understanding of how this intervention produces clinical benefits. Examination of patient characteristics predicting differential response to stretching versus PRT would support personalized treatment approaches. Finally, cost-effectiveness analyses comparing these interventions would inform healthcare resource allocation decisions.

## 5. Conclusion

This Pilot study demonstrated that both stretching exercises and positional release technique effectively reduce pain severity and improve functional capacity in individuals with gluteal pain syndrome. Positional release technique produced significantly greater improvements compared to stretching exercises alone, with larger reductions in pain intensity and functional disability scores. These findings support the use of PRT as an effective treatment option for gluteal pain and suggest it may be preferred over stretching alone for patients seeking rapid symptom relief. Both interventions demonstrated excellent safety profiles with no reported adverse events. Healthcare providers managing gluteal pain syndrome should consider incorporating PRT into their treatment armamentarium while recognizing stretching exercises as a valuable component of comprehensive rehabilitation. Future research should explore long-term outcomes, optimal treatment parameters, and mechanisms underlying differential treatment effects to further refine clinical recommendations for this prevalent and disabling condition.

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