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Effectiveness of conventional physiotherapy versus Maitland Mobilization on coccydynia in postpartum women.

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Abstract
Background: Coccydynia, or tailbone pain, is commonly seen in postpartum women due to childbirth-related trauma or pressure. It affects daily activities like sitting, standing, and childcare, increasing pain leading to reduced quality of life. A physiotherapy approach mobilization, exercise can effectively relieve coccydynia symptoms and help prevent recurrence.
Objectives: "Effectiveness of Conventional Physiotherapy Versus Maitland Mobilization on Coccydynia in Postpartum Women" was conducted to evaluate and compare the impact of conventional physiotherapy versus Maitland mobilization in managing coccydynia among postpartum women.
Method: A total of thirty-six participants aged 18–35 years in the early postpartum period were randomly assigned to two groups: Group A received conventional physiotherapy with conservative techniques, while Group B received Maitland mobilization in addition to conventional physiotherapy. Interventions were administered twice weekly over two weeks. Outcome measures included the Numerical Pain Rating Scale (NPRS) and the SF-36 Health Survey for quality of life (QoL).
Result: Both groups demonstrated significant improvements in pain and QoL ($p < 0.05$); however, the Maitland group showed greater reductions in pain (36% vs. 29.1%) and higher improvements in QoL (32.2% vs. 12.3%).
Conclusion: These findings suggest that Maitland mobilization, when combined with conventional physiotherapy, is more effective than conventional physiotherapy alone in improving pain and quality of life among postpartum women with coccydynia.

Keywords: Coccydynia, postpartum women, conventional physiotherapy, Maitland mobilization, pain, QoL

Introduction
Coccydynia, or tailbone pain, was first formally described in 1859 by Sir James Young Simpson, though references to the condition date back to the 16th century, highlighting its long-standing clinical recognition. [1] The word "coccyx" comes from the Greek term *Kokkyx*, meaning the beak of a cuckoo bird, due to its similar shape. [2] Coccydynia (tailbone pain) is pain in the coccyx and nearby tissues, often worsened by sitting, standing up, or defecation. [3] Coccydynia greatly affects quality of life, limiting routine functions and daily activities**.** [4] Coccydynia is more common in postpartum women due to prolonged sitting, poor breastfeeding posture, and childbirth-related trauma. [5] Coccydynia is about five times more common in females, mainly due to pelvic anatomy differences and hormonal factors increasing coccyx vulnerability.[6] The coccyx is a small triangular bone of 3–5 fused segments, supported by pelvic muscles and ligaments that aid pelvic floor stability and bowel control.[7] Primary coccydynia has no clear cause, while secondary coccydynia is linked to factors like trauma, weight changes, childbirth, surgery, degeneration, or infection.[8] Coccygeal injury causes local pain, swelling, and tenderness, and may also lead to lumbosacral, gastrointestinal, menstrual, or neurogenic issues.[9] Lower back and buttock pain is common during and after pregnancy, often arising from various causes, with childbirth being an important contributing factor.[10] Coccydynia is highly prevalent in postpartum women, with around 86.5% reporting coccygeal pain, highlighting childbirth as a major risk factor.[11] Coccygeal curvature varies among individuals and is classified into six types (I–VI) by Nathan *et al*. Type I (slight anterior curve) is most common, while Types V (posterior curve) and VI (lateral deviation) are more frequent in females, linking morphology to coccygeal disorders.[12] Pregnancy and childbirth, especially vaginal delivery, can exacerbate coccydynia by causing coccygeal ligament strain, trauma, or even fracture/dislocation, making postpartum women particularly vulnerable.[13] Localized coccygeal tenderness, especially around the pubococcygeal and sacrococcygeal ligaments, along with assessment of nearby muscles and joints, is a key diagnostic indicator in coccydynia.[14] Diagnosis of coccydynia involves history, physical exam and tests like SLR but per rectal examination is considered the most reliable diagnostic tool.[15] Conservative treatment is the first-line approach for coccydynia, including NSAIDs, cushions, physiotherapy and exercises, while surgery is a last resort.[16] Self-care measures like supportive footwear, proper seating, side-lying with pillows, heat/cold therapy, massage, and posture breaks can relieve coccydynia symptoms.[17] Postpartum coccydynia is under-researched, highlighting the need for evidence-based protocols. A multidisciplinary approach with physiotherapy, mobilization, stretching, and medications may provide effective relief and prevent recurrence. [18]

Need for the Study

Coccydynia, or tailbone pain, is a common yet often underdiagnosed condition in postpartum women, primarily due to trauma or pressure during childbirth. It significantly affects daily activities such as sitting, standing, and performing childcare duties, thereby reducing quality of life. Conventional physiotherapy offers pain relief and functional improvement, while Maitland mobilization has shown promising results in addressing joint dysfunction and relieving pain. However, limited studies directly compare the effectiveness of these two approaches specifically in postpartum women with coccydynia. Hence, there is a need to evaluate and compare both interventions to determine the effective treatment method for reducing pain & improving quality of life in terms of NPRS & SFF-36.

Aims

To compare the effectiveness of conventional physiotherapy versus maitland mobilization on coccydynia in postpartum women over a two weeks period in order, using the NPRS and SF-36 to assess pain and quality of life.

Methodology & materials

1. **Methodology**

   The study was conducted as a comparative study on postpartum women diagnosed with coccydynia, aged between 18 to 35 years. The participants were recruited using a convenience sampling method from hospitals in Nashik and A'nagar districts. A total sample size of 36 participants was included in the study and further divided into two groups: Group A (18 participants) and Group B (18 participants). The study duration was six months, while the intervention period for each participant extended over two weeks.

2. **Materials**

   The materials required for the study included a chair, cushions of different types (wedge, U-shaped, and donut), an ice pack, gloves, sanitizer, a pillow, a plinth, and towels. These materials were utilized to ensure participant comfort and hygiene throughout the study.

3. **Selection Criteria**

Inclusion Criteria

- Early Postpartum period women's with coccydynia.
- Women who have aged between 18-35 years.
- Women who understand the exercise sheet.
- Women who having stable medical conditions

Exclusion Criteria

- Women who have coccyx pain associated with single axis traumatic injury.
- Women who have receive other form of alternative treatment.
- Women with neurological conditions affecting pain perception or mobility.

Outcome Measures

1. **Numerical pain rating scale (NPRS):** The NPRS is a unidimensional tool measuring pain intensity on a 10-point scale (0 = no pain, 10 = worst imaginable pain). It is simple, quick (<1 min), and usable in self-report, interviews, or telephone formats across languages and cultures. Preferred over the Visual Analogue Scale (VAS), it demonstrates high test–retest reliability (r ≈ 0.95) and strong construct validity (r = 0.86–0.95 vs VAS)**.** It is sensitive to small changes in pain but may not capture the multidimensional complexity of chronic pain experiences.

2. **SF-36:** The SF-36 is a validated, multidimensional health-related quality of life (HRQoL) measure developed from the Medical Outcomes Study. It contains 36 items across 8 domains (Physical Functioning, Role Physical, Bodily Pain, General Health, Vitality, Social Functioning, Role Emotional, Mental Health), summarized into Physical (PCS) and Mental (MCS) component scores**.** Each domain is scored 0–100 (higher = better health)**.** It shows high reliability, strong validity, and responsiveness to clinical change, making it widely applicable in clinical trials, epidemiology, and health services research.

Intervention

A total of 36 participants were recruited and screened as per inclusion and exclusion criteria, with informed consent obtained before participation. Participants were randomly divided into two groups: Group A (n = 18) received conservative techniques with conventional physiotherapy, while Group B (n = 18) received Maitland mobilization along with conventional physiotherapy. The intervention lasted 2 weeks, with two sessions per week, each session lasting 30 minutes including rest periods.

Group A: Conventional physiotherapy & Conservative Techniques (Control Group)
Group B: Conventional physiotherapy & Maitland mobilization (Experimental Group)

Group-A (Control Group)

Participants received verbal instruction and a pamphlet outlining the planned physiotherapy and conservative treatments during their first visit. They were then instructed to perform the exercises independently at home.

a. **Conventional Physiotherapy Treatment**
a. **Kegel Exercise (Buttock Squeezes)**

- Lying or sitting, squeeze buttocks together, hold for 10 seconds and relax, repeat 10 times.
- Inhale deeply, allowing air to fill the bottom of lungs.
- Feel lower abdomen,
- Low back, and pelvic floor gently stretch outwards with breath.
- As exhale, contract pelvic floor muscles.
- Feeling pelvic floor lift up and in and belly button move towards spine.
- Relax pelvic floor during the next inhale.

Fig 1: Kegal Exercise

b. Pelvic tilting

- Start lying down with knees bent and feet resting on the bed, draw in lower abdomen.
- At the same time tuck tailbone under, flattening the curve of lower back,
- Keep breathing while holding this position for a few moments and then relax

Fig 2: Pelvic Tilting

c. Clamshell Exercise

- Lying on side with knees and heels together.
- Lift the top leg off the other without rocking backwards and keeping heels together.
- Repeat 10 times each.

Fig 3: Clamshell Exercise

d. Hamstring stretches

- Place one foot slightly forward, keeping the heel on the ground and the toes pointing upward.
- Keep the back leg slightly bent and body weight on the back leg.
- Hinge at the hips (not the waist), and slowly lean upper body forward over the extended leg.
- Keep back straight and chest open. Avoid rounding the spine.
- should feel a stretch along the back of the front thigh (hamstring).
- Maintain the stretch for 10 seconds. Slowly return to the standing position.
- Switch legs and repeat the stretch on the opposite side. Perform 2–3 repetitions on each leg.

Fig 4: Hamstring Stretch

b. Conservative Techniques

1. Sitting

Avoid sitting for extended periods of time, especially on hard surfaces. Maintain good posture when sitting down:

- The posture should be sitting.
- Maintain an upright posture
- Hold back against the chair.
- Maintain knees at the same level as hips.
- Maintain feet on the ground.
- Soften shoulders.

2. Cushions

Make sure sitting on a suitable cushion with feet flat on the ground and back supported, with weight resting on sitting bones under buttocks. Do not sit down. In the lower bend of spine, may use a rolled-up towel or tiny cushion that provides extra support. It is possible to attempt leaning forward in chair while seated. Pain can also be lessened by using a pressure relief cushion that is shaped like a wedge, a U, or a doughnut. Over a period of three weeks, the cushions are recommended.

3. Icepack-

Using ice-wrap ice pack/frozen peas in a tea towel and place on the painful area for 10-20 minutes. Can be used up to 3 times a day. The icepack can be recommended, over a 3 weeks period

(Experimental Group)

This group received conventional physiotherapy treatment and Maitland mobilization during the hospital visits, which included the planned exercise that was supervised by the therapist.

a. Conventional physiotherapy treatment

Conventional physiotherapy treatment should be same as above explained.

b. Maitland mobilization

The Maitland mobilization technique, which uses graded, passive joint movements to improve mobility, lessen pain, and improve function, is a form of manual therapy. It can be especially helpful for treating coccydynia (tailbone pain), sacroiliac joint stiffness, and pelvic girdle dysfunction in women after childbirth. During childbirth, the pelvic region undergoes major alterations, including hormonal laxity (due to relaxin), which can result in joint instability or misalignment. Trauma during delivery (such as prolonged labor or the usage of forceps) can cause coccygeal subluxation or hypomobility. Postural changes, especially with breastfeeding or childcare, frequently cause pelvic and lumbar pain. Maitland mobilization is a safe and effective treatment for these problems in postpartum women because it does not involve harsh manipulation. Indications in Postpartum Women: Sacroiliac joint dysfunction, Lumbar or pelvic stiffness, Limited mobility following delivery, Coccygeal pain (tailbone pain), Pubic symphysis pain, and Postural back discomfort.

Table 1: The Maitland Grading System is as follows

Grade	Decription	Use in postpartum
Grade I	Small-amplitude movement at the beginning of range	Pain relief, gentle mobilization
Grade II	Large-amplitude movement within midrange	Pain reduction, mild stiffness
Grade III	Large-amplitude movement reaching end range	Stretching tight structures (used cautiously)
Grade IV	Small-amplitude movement at end range	Improve joint mobility (not commonly used early postpartum women)

Technique

Patient Position

- Lying on one's side
- Lay down on the unaffected side, with your knees and hips somewhat bent.
- For alignment, a little cushion can be positioned between the knees and beneath the head.
- Maintain a neutral spine position.
- Tailbone area should be easily accessible and not under pressure.

Therapist Hand Position

- The therapist is standing behind the patient.
- One hand feels the sacrococcygeal joint.
- It's possible that the other hand will either stabilize the pelvis or direct the mobilization.

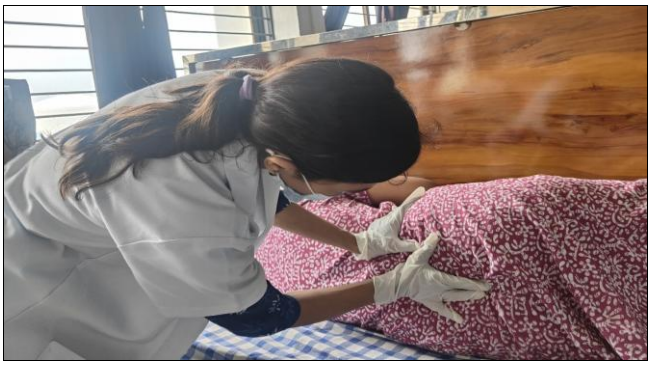

Fig 5: Therapist Hand Position

Mobilization Execution

- Apply Grade I or Grade II anterior–posterior (A–P) or oscillatory mobilizations to the coccyx or sacrococcygeal joint.
- Movements are gentle, rhythmic, and within the pain-free range.
- Each oscillation lasts about 1–2 seconds, repeated for 30–60 seconds per set, depending on patient tolerance.
- Usually, 3–4 sets are performed per session.

Mobilization Directions

- Anterior–posterior glide (A–P)
- Caudal or cranial glide if coccyx is deviated or hypomobile.

Fig 6: Mobilization Direction

Purpose & Benefits

- Reduces pain and mechanical irritation in the coccyx and pelvic joints
- Promotes early functional recovery (sitting, walking, posture)
- Improves joint mobility and corrects minor misalignments
- Encourages neuromuscular re-education when paired with therapeutic exercises

Precautions

- Avoid in cases of recent coccyx fracture, infections, or unhealed perineal trauma.
- Proceed gently if there's hypermobility or ligament laxity.
- Always ensure informed consent and patient comfort during mobilization.

Follow-up

After mobilization, the patient may be advised to perform: Pelvic tilts, Gentle stretching, Kegel exercises to maintain mobility and build stability around the coccyx.

Contraindications

- Recent perineal or pelvic floor trauma
- Unhealed episiotomy or C-section wounds
- Active infection, fever, or systemic inflammation
- Known fractures of coccyx or pelvis

- Severe pelvic floor dysfunction or prolapse (needs prior clearance)
- Always performed by a trained physiotherapist with pelvic health expertise

Result

The collected data was systematically organized and analysed using percentage calculations and appropriate statistical methods to interpret the findings accurately. Statistical analysis was performed using StatistiXL version 2.0, ensuring reliable computation of descriptive statistics. Mean and standard deviation (SD) values were calculated to summarize the central tendency and variability of the data.

To enhance clarity and aid in interpretation, graphical representations such as charts and graphs were prepared using Microsoft Excel and StatistiXL version 2.0. These visual tools were utilized to present the data distribution and comparison between groups effectively, supporting the statistical inferences drawn from the study.

A total of 36 participants were analysed (Group A: n = 18, control; Group B: n = 18, experimental).

1. **NPRS (Pain) Comparison:** Within-group analysis (paired t-test) showed a significant reduction in pain scores in both groups ($p < 0.01$).

Group A: Mean decreased from 5.6 to 3.9 (29.1% reduction).

Group B: Mean decreased from 5.8 to 3.7 (36.0% reduction).

Between-group analysis (unpaired t-test) indicated significantly greater pain reduction in Group B ($p < 0.05$), suggesting superior effectiveness of the intervention in Group B.

2. **SF-36 (Quality of Life) Comparison:** Within-group analysis (paired t-test) revealed a significant increase in QOL scores in both groups ($p < 0.01$).

Group A: Mean increased from 50.0 to 56.1 (12.3% increase).

Group B: Mean increased from 49.0 to 64.8 (32.2% increase).

Between-group analysis (unpaired t-test) confirmed that the improvement was significantly greater in Group B ($p < 0.01$), highlighting the higher effectiveness of the intervention used in Group B.

Overall: Both interventions were effective in reducing pain and improving quality of life, but Group B demonstrated significantly greater improvement in NPRS and SF-36 outcomes, making it the more effective intervention.

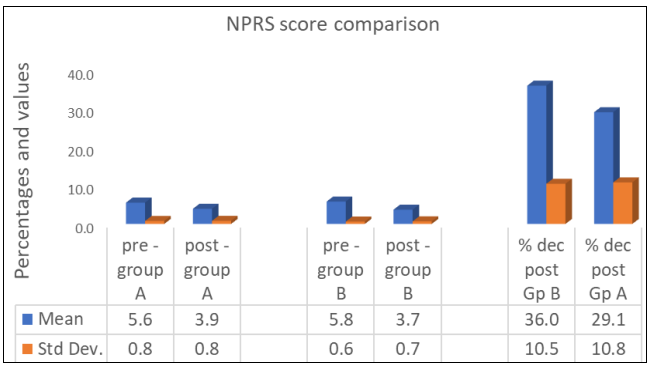

Table 1: NPRS score comparison

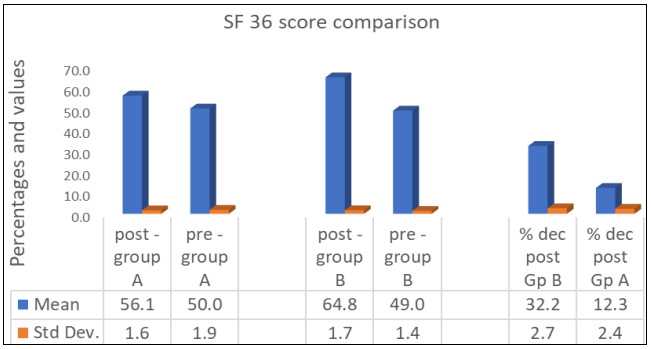

Table 2: SF-36 score comparison

Discussion

The present study compared the effectiveness of conventional physiotherapy versus Maitland mobilization in postpartum women with coccydynia. The study revealed a reduction in pain levels in both groups, as measured by the Numeric Pain Rating Scale (NPRS). In Group A (Controlled Group), the mean NPRS score decreased notably from 5.6 to 3.9. Meanwhile, Group B (Experimental Group) experienced a more moderate reduction from 5.8 to 3.7. Despite the initial expectation, Group B exhibited a greater percentage decrease in pain (36.0%) compared to Group A (29.4%), and this difference was statistically significant. In terms of quality of life (QoL), assessed via the SF-36 scale, both groups showed improvements. However, Group B demonstrated a significantly greater increase, with scores rising from 50.0 to 56.1, whereas Group A showed a comparatively smaller improvement from 50.1 to 52.2. The percentage increase in SF-36 scores was 32.2% in Group B, notably higher than the 12.3% observed in Group A. This difference in QoL improvement between the groups was also statistically significant.

The findings indicated that although both groups experienced reductions in pain and enhancements in quality of life, participants receiving Maitland mobilization achieved superior outcomes, reflected by a greater percentage reduction in NPRS scores and more pronounced improvements in SF-36 scores. These results suggest that manual mobilization techniques may provide more effective relief than conventional physiotherapy alone for managing pain and functional impairments in postpartum coccydynia. The mechanism can be explained through pain modulation via the Gate Control Theory, where joint mechanoreceptor stimulation reduces nociceptive input to the spinal cord, thereby diminishing pain perception. Furthermore, oscillatory mobilization may promote endorphin release, contributing to analgesic effects. Gentle joint oscillations also help stretch contracted joint capsules, reduce minor adhesions, and enhance joint play, collectively alleviating mechanical pain. Reduces hypertonicity of pelvic floor and gluteal muscles by normalizing reflex activity. With pain reduction, postpartum women are better able to sit comfortably during feeding and childcare, while improved mobility and confidence support their return to daily routines and caregiving responsibilities.

These results are supported by Basharat *et al*. (2023) [18], who found that combining piriformis and iliopsoas stretching with Maitland mobilization significantly reduced pain intensity and improved sitting tolerance compared to conventional care. Stretching in postpartum coccydynia works through pain inhibition, soft tissue elongation,

improved circulation, and posture correction, ultimately reducing coccygeal stress and enhancing quality of life. Similarly, Tufekci *et al*. (2024) demonstrated that adding manual mobilization techniques to exercise therapy yielded superior short-term outcomes in chronic coccydynia, though long-term effects tended to diminish.

Taken together, the findings emphasize the role of Maitland mobilization as an effective adjunct to physiotherapy in managing postpartum coccydynia, offering both pain relief and improved quality of life. However, further studies with larger sample sizes and longer follow-up periods are recommended to establish sustained long-term benefits.

Conclusion

The study ultimately concludes that people who satisfied the inclusion criteria experienced significant changes in pain levels (measured by NPRS) and quality of life (measured by SF-36) in both Group A (control) and Group B (experimental). But Group B consistently demonstrated regulated results across all tested parameters. Compared to individuals in the control group, those in the controlled group had a higher percentage drop in pain and a more notable increase in their quality of life ratings. According to these results, regulated physiotherapy is a more successful strategy for pain control and quality of life improvement in this group because it increases patient compliance, motivation, and general therapy efficacy.

Limitation

In order to interpret these results, one must take into account a number of restrictions. Because the sample size is comparatively tiny, the study's applicability is restricted. Furthermore, the study's reliance on self-reported data, which is susceptible to reporting bias and might compromise the validity of the findings, was significant. The limited follow-up time also limits knowledge of the interventions' long-term effects. Furthermore, the validity of the comparisons between groups may have been impacted by adherence to the home exercise program and the timely use of conservative management in the uncontrolled group, which may have had an impact on both participation and outcomes.

Future scope and suggestion

Future research should aim to include bigger and more diverse participant groups in order to increase the overall generalizability of the results. Patients must come to the hospital for check-ups to assess long-term results, which might interfere with their capacity to complete recommended workouts at home regularly and effectively. Additionally, assessing overall and domain-specific results, as well as objective indicators of physical performance, will shed light on the underlying processes driving the noted gains. Additionally, this method can aid in the improvement of conservative management techniques and home workout regimens in the uncontrolled group, making them more useful in the real world.

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