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Impact of Iliopsoas Stretching on Posture and Mobility: A Case Study

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Abstract

Background: The iliopsoas is a deep hip flexor complex formed mainly by the psoas major and iliacus muscles. Because it crosses the lumbar spine, pelvis, and hip joint, adaptive shortening of this muscle group may influence anterior pelvic tilt, lumbar lordosis, hip extension, stride length, standing posture, and transitional mobility. In many adults, prolonged sitting, reduced activity, repeated hip-flexed postures, and insufficient hip-extension movement can contribute to iliopsoas tightness. This tightness may not only produce anterior hip discomfort or low back strain but may also create altered movement strategies during walking, sit-to-stand, stair climbing, and upright standing. Stretching of the iliopsoas is therefore frequently used in physiotherapy practice to restore hip extension, improve lumbopelvic alignment, and support functional mobility.

Presentation of a Case: This case study presents a 36-year-old male office worker who reported gradual onset low back discomfort, anterior hip tightness, reduced walking comfort, poor standing posture, and difficulty maintaining an upright position after long sitting hours. The patient demonstrated excessive anterior pelvic tilt, increased lumbar lordosis, restricted hip extension, positive modified Thomas test findings, reduced gluteal activation, and a shortened stride pattern. Symptoms were aggravated by prolonged sitting, fast walking, climbing stairs, and standing after work. No red flag signs were present, and the main clinical impression was postural and functional mobility impairment associated with iliopsoas tightness and lumbopelvic muscle imbalance.

Intervention: A structured phase-wise physiotherapy program was implemented for 8 weeks. The program included pain education, postural awareness, diaphragmatic breathing, pelvic control training, modified Thomas-position iliopsoas stretching, half-kneeling hip flexor stretching with posterior pelvic tilt, active mobility drills, gluteus maximus and gluteus medius strengthening, abdominal stabilization, gait retraining, sit-to-stand training, stair practice, and home exercise reinforcement. Stretching was progressed from low-load sustained holds to controlled functional hip-extension positions while avoiding compensatory lumbar hyperextension.

Outcome Measure: Pain was assessed using the Numerical Pain Rating Scale, hip range of motion was measured by goniometry, iliopsoas length was assessed by the modified Thomas test, postural alignment was observed through anterior pelvic tilt and lumbar lordosis behavior, muscle strength was assessed using Manual Muscle Testing, and functional mobility was assessed through walking

tolerance, sit-to-stand performance, stair negotiation, gait speed, step length, and the Timed Up and Go test.

Result: After 8 weeks of supervised and home-based physiotherapy, the patient demonstrated reduced pain, improved passive and active hip extension, reduced anterior pelvic tilt during relaxed standing, better pelvic control during walking, improved gluteal activation, increased walking tolerance, smoother sit-to-stand, and improved stair performance. Pain during prolonged sitting decreased from 7/10 to 2/10, pain during walking decreased from 6/10 to 1/10, hip extension improved from a restricted position to functional extension, and mobility became more efficient with less lumbar extension compensation.

Conclusion: This case study indicates that patient-specific iliopsoas stretching, when combined with postural retraining, gluteal strengthening, core stabilization, and functional mobility practice, may improve posture and mobility in an adult with hip flexor tightness and lumbopelvic movement dysfunction. The findings support the clinical importance of addressing iliopsoas flexibility as part of an integrated rehabilitation program rather than using stretching as an isolated technique.

Keywords: Iliopsoas stretching, posture, mobility, anterior pelvic tilt, lumbar lordosis, hip flexor tightness, physiotherapy, gait training, modified Thomas test, case study.

Background

The iliopsoas muscle group is one of the most important links between the trunk and the lower limb. The psoas major arises from the lumbar vertebrae and the iliacus arises from the iliac fossa; together they insert near the lesser trochanter of the femur. Because of this anatomical arrangement, the iliopsoas can influence hip flexion, lumbar spine position, pelvic control, and the movement pattern used during walking and standing. When the muscle is functioning normally, it assists in controlled hip flexion, contributes to trunk stability, and allows the hip to move into extension during terminal stance of gait. When the muscle becomes adaptively shortened, the pelvis may be drawn toward anterior tilt and the lumbar spine may appear more lordotic during relaxed standing.

Postural imbalance related to iliopsoas tightness is commonly seen in individuals who sit for long periods, such as students, office workers, drivers, and computer professionals. During prolonged sitting, the hip remains flexed for extended periods. If regular hip-extension movement and posterior-chain strengthening are not performed, the anterior hip structures may become stiff and the gluteal muscles may become less active during functional tasks. This pattern may influence the way a person stands, walks, climbs stairs, or rises from a chair. The patient may not always complain of hip pain; instead, the complaint may appear as low back discomfort, fatigue in standing, difficulty walking fast, reduced step length, or an inability to maintain an erect posture comfortably.

The concept of posture in this case is not limited to a static position. Posture includes the ability to maintain alignment during movement, transfer weight efficiently, and control the relationship

between the lumbar spine, pelvis, and hip. A person with an anterior pelvic tilt tendency may increase lumbar extension during standing and walking to compensate for inadequate hip extension. Such compensation can increase load on posterior lumbar structures and may reduce efficiency during gait. In daily life, this may present as fatigue after standing, discomfort while walking uphill, a tendency to lean forward while climbing stairs, or difficulty keeping the pelvis neutral during exercise.

Mobility is also affected by hip flexor length. During walking, the hip must extend behind the body in terminal stance before the limb swings forward. If hip extension is restricted, the person may take shorter steps, rotate the pelvis excessively, increase lumbar extension, or walk with reduced speed. In sit-to-stand, limited hip extension and weak gluteal control may cause excessive trunk momentum or difficulty finishing the upright posture. During stair climbing, inadequate hip extension and poor lumbopelvic control can create early fatigue, altered knee mechanics, and reduced confidence. Therefore, restoring iliopsoas length can have value beyond a simple stretching response; it may help improve the quality of functional movement.

Iliopsoas stretching is commonly prescribed in different forms. These include the modified Thomas-position stretch, half-kneeling hip flexor stretch, low lunge stretch, prone hip extension stretch, and contract-relax or hold-relax techniques. For postural correction, the stretch must be performed with correct pelvic positioning. If the patient arches the lower back during the stretch, the apparent movement may come from lumbar extension rather than true hip extension. For this reason, posterior pelvic tilt, gentle abdominal activation, and gluteal contraction are often used to direct the stretch toward the anterior hip and prevent excessive lumbar loading.

The present case study focuses on the effect of iliopsoas stretching on posture and mobility in a patient with postural imbalance and functional limitation. The emphasis is not only on increasing range of motion but also on integrating the gained mobility into standing alignment, gait, stair negotiation, transfers, and everyday activity tolerance. A structured physiotherapy program was used so that stretching could be supported by strength, motor control, and functional retraining.

Epidemiology: Prolonged sitting, reduced physical activity, and repetitive hip-flexed work positions are common lifestyle factors among adults and are frequently associated with hip flexor stiffness, reduced hip extension, low back discomfort, and altered postural control. Iliopsoas tightness may be observed in young adults, middle-aged office workers, athletes, and older individuals with reduced mobility.

Prevalence: Postural deviations such as anterior pelvic tilt, increased lumbar lordosis behavior, reduced hip extension, shortened step length, and low back discomfort are commonly encountered in physiotherapy practice. Although not all cases are caused by iliopsoas tightness, restricted hip flexor length is a clinically relevant contributor in many patients with lumbopelvic movement dysfunction.

Scope of the study: The purpose of this case study is to evaluate the influence of iliopsoas stretching on posture, pain, hip mobility, muscle activation, walking tolerance, sit-to-stand performance, stair negotiation, and overall functional mobility in an adult patient with postural and movement impairment.

Clinical presentation

Patient data

The patient was a 36-year-old male office employee who worked approximately 8 to 10 hours per day in a seated computer-based position. He reported a gradual onset of low back discomfort and anterior hip tightness over the previous six months. His symptoms were not related to a single traumatic event. He described the pain as dull, pulling, and tiring in nature, mainly present around the lower lumbar region and anterior aspect of both hips, with slightly greater tightness on the right side. The symptoms were aggravated after long sitting, especially when he stood up from his chair and attempted to walk immediately.

The patient reported that his walking had become less comfortable during the previous two months. He noticed that his stride had become shorter, and he felt stiffness in the front of the hip while walking fast. Climbing stairs at the end of the working day produced fatigue and a sensation of tightness around the anterior hip. He also reported difficulty maintaining an upright standing posture during meetings or while waiting in a queue. He frequently shifted weight from one leg to another and tended to stand with increased lumbar arching.

The patient had no history of spinal surgery, hip surgery, fracture, inflammatory joint disease, neurological disorder, recent fall, bowel or bladder symptoms, unexplained weight loss, fever, or night pain. He had previously used occasional analgesic medication and had tried general stretching videos, but the benefit was temporary because the movements were not performed with appropriate pelvic control. The patient was independent in all activities of daily living, but his work tolerance, walking comfort, and exercise confidence were reduced.

On initial physiotherapy assessment, the patient appeared cooperative and motivated. He reported that his main expectation was to stand straighter, reduce stiffness after sitting, walk without anterior hip pulling, and return to light fitness activity. Clinical screening suggested that the primary movement problem involved restricted hip extension, tight iliopsoas, anterior pelvic tilt tendency, reduced gluteal activation, and poor control of lumbar extension during hip-extension tasks. Based on these findings, an iliopsoas-focused stretching and lumbopelvic control program was planned.

Clinical Examination and Findings

General observation:

- The patient was conscious, oriented, cooperative, and able to follow instructions during assessment.
- Relaxed standing showed an increased anterior pelvic tilt tendency with visible lumbar lordosis behavior.

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- The patient stood with slight hip flexion bias and reported pulling in the anterior hip when asked to stand tall.
- Forward bending was comfortable, but return to upright posture was accompanied by lumbar extension compensation.
- Sit-to-stand was independent but required increased trunk momentum and showed delayed hip extension at the end of the movement.
- Walking assessment showed shortened stride length, reduced terminal hip extension, and mild anterior pelvic rotation compensation.
- No neurological deficit, sensory loss, or red flag clinical sign was observed.

Local Examination (Lumbopelvic and Hip Complex)

- Postural alignment: Increased anterior pelvic tilt tendency with increased lumbar extension during relaxed standing.
- Skin and local temperature: Normal, with no swelling, redness, or inflammatory sign around the hip or lumbar region.
- Tenderness: Mild tenderness was present over the iliopsoas region and lumbar paraspinal area on palpation.
- Muscle length: Modified Thomas test suggested bilateral hip flexor tightness, more marked on the right side.
- Movement control: The patient substituted lumbar extension during hip-extension testing and stretching positions.
- Muscle activation: Reduced gluteus maximus activation was noted during bridge and prone hip extension tasks.
- Functional mobility: Walking and stair climbing were independent but inefficient and associated with early tightness.

Table 1: Range of Motion (ROM) - Hip and Lumbopelvic Region

Movement / Test	Normal ROM / Expected Finding	Pre-Rehabilitation
Right hip extension	0-20 degrees	0-4 degrees with lumbar extension compensation
Left hip extension	0-20 degrees	0-6 degrees with anterior hip tightness
Modified Thomas test - right	Thigh reaches table level without pelvic compensation	Positive; thigh remained above table with anterior hip pull
Modified Thomas test - left	Thigh reaches table level without pelvic compensation	Positive; mild-to-moderate hip flexor tightness
Lumbar extension control	Movement without excessive hinging	Excessive lumbar hinging during hip extension task
Functional hip extension during gait	Visible terminal stance extension	Reduced terminal stance with short step length

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Table 2: Muscle Tone Assessment - Lumbopelvic and Hip Muscles

Muscle Group	Muscle Tone Grade	Description
Iliopsoas	1+	Mild-to-moderate protective tightness with resistance to hip extension
Rectus femoris	1	Mild tightness during modified Thomas position
Lumbar erectors	1	Mild increased resting tone associated with lordotic posture
Gluteus maximus	0	Normal tone but reduced functional activation
Hamstrings	0	Normal tone with no major length restriction

Table 3: Muscle Strength Assessment - Lumbopelvic and Hip Region (MMT)

Muscle Group / Function	Pre-Rehabilitation
Gluteus maximus / hip extension	Grade 3/5 with delayed activation
Gluteus medius / hip abduction	Grade 3+/5 with pelvic drop tendency
Abdominal control / pelvic stabilization	Grade 3/5; difficulty maintaining posterior pelvic tilt
Hip flexors	Grade 4/5 but shortened and overactive in functional posture
Back extensors	Grade 4/5 with tendency to dominate over hip extensors
Functional mobility control	Fair; compensatory lumbar extension during standing and gait

Table 4: Pain Assessment - NPRS Scale

Activity	Pre-Rehabilitation
At rest	2/10
After prolonged sitting	7/10
During standing after sitting	6/10
During fast walking	6/10
During stair climbing	5/10
During functional exercise	6/10

Uniqueness of the Study

This case study is unique because it focuses specifically on the relationship between iliopsoas stretching, postural alignment, and functional mobility. Many rehabilitation descriptions discuss hip flexor stretching as a general flexibility exercise, but this case emphasizes how the same stretch can influence standing posture, pelvic control, walking pattern, sit-to-stand performance, stair movement, and daily activity tolerance when it is applied with correct technique and supported by strengthening. The case also highlights that stretching alone is not sufficient if the patient continues to compensate with lumbar hyperextension. Therefore, the intervention used pelvic positioning, abdominal control, and gluteal activation to ensure that the stretch was directed toward the iliopsoas rather than being absorbed by the lumbar spine.

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Another distinctive feature of the study is the integration of impairment-level and activity-level outcomes. Improvement was not judged only by a change in hip extension range. The case considered whether the patient could stand with less anterior pelvic tilt, walk with a longer and more relaxed step, rise from a chair more efficiently, negotiate stairs with less anterior hip pulling, and tolerate work-related sitting with fewer symptoms. This makes the case clinically useful for physiotherapists managing adults whose postural and mobility limitations are linked to prolonged sitting and hip flexor tightness.

Investigations and Findings - Lumbopelvic-Hip Complex

Table 5: Investigations and Findings

Investigation / Assessment	Time	Findings
Lumbar and pelvic clinical screening	Initial visit	No red flag signs; symptoms mechanically related to posture and movement
Modified Thomas test	Pre-rehabilitation	Bilateral iliopsoas tightness, greater on right side
Goniometric hip extension assessment	Pre-rehabilitation	Restricted hip extension with lumbar compensation
Postural observation	Pre-rehabilitation	Anterior pelvic tilt tendency and increased lumbar lordosis behavior
Gait observation	Pre-rehabilitation	Shortened stride length and reduced terminal hip extension
Functional mobility reassessment	Week 4 onward	Improved posture awareness, better hip extension control, and reduced tightness after sitting

Physiotherapy management

The physiotherapy program was designed to reduce pain, improve iliopsoas flexibility, restore hip extension, correct lumbopelvic compensation, activate the gluteal and abdominal muscles, and improve functional mobility. The program was planned in progressive phases so that stretching could first be learned safely and then transferred into standing, walking, stairs, and daily work-related postures. The patient attended supervised sessions three times per week and performed a structured home program on the remaining days.

Phase I: Pain control, posture awareness and protected mobility Phase (Week 0-2)

Aims

- Reduce low back discomfort and anterior hip tightness
- Teach neutral pelvis and avoid excessive lumbar extension
- Introduce safe iliopsoas stretching positions
- Improve breathing and relaxation of overactive lumbar muscles
- Begin gentle gluteal and abdominal activation

Interventions

- Patient education regarding the role of prolonged sitting and hip flexor tightness
- Diaphragmatic breathing in supine with supported hips
- Posterior pelvic tilt practice in crook lying
- Supine modified Thomas-position gentle iliopsoas stretch with therapist guidance
- Half-kneeling hip flexor stretch using posterior pelvic tilt and gluteal squeeze
- Low-load abdominal bracing without breath holding
- Gluteal setting and short bridge within pain-free range
- Standing posture correction using wall feedback
- Short walking bouts with awareness of step length and trunk position
- Workstation advice including regular movement breaks and avoidance of continuous hip-flexed posture

Phase II: Mobility and controlled hip-extension Phase (Week 2-4)

Aims

- Increase hip extension range without lumbar compensation
- Improve flexibility of iliopsoas and rectus femoris
- Enhance pelvic control in kneeling and standing positions
- Improve sit-to-stand movement quality
- Reduce pain after prolonged sitting

Interventions

- Progressive modified Thomas stretch with 30-second sustained holds
- Half-kneeling iliopsoas stretch with arm reach and controlled breathing
- Active hip-extension mobility in prone and standing
- Contract-relax technique for iliopsoas where tolerated
- Side-lying hip extension control with therapist cueing
- Bridge progression emphasizing gluteus maximus activation
- Clamshell and side-lying hip abduction exercises for gluteus medius
- Sit-to-stand retraining with neutral pelvis and equal weight bearing
- Walking drills emphasizing relaxed stride and upright trunk
- Home stretching log to improve adherence and symptom monitoring

Phase III: Strengthening and functional posture Phase (Week 4-6)

Aims

- Strengthen gluteal and abdominal muscles
- Integrate improved hip extension into gait and transfers
- Reduce anterior pelvic tilt tendency during standing
- Improve stair climbing and walking tolerance

- Increase confidence in functional exercise

Interventions

- Resisted bridging and single-leg bridge preparation
- Standing hip extension with resistance band while maintaining pelvic control
- Mini squats with neutral spine and hip-dominant movement
- Step-up training with gluteal activation
- Side stepping with resistance band for pelvic stability
- Dead bug variations for abdominal control
- Tall-kneeling and half-kneeling balance with controlled hip extension
- Gait retraining with longer step length and reduced lumbar arching
- Stair ascent and descent practice with postural cueing
- Functional reaching tasks in standing without anterior pelvic collapse

Phase IV: Advanced functional mobility and maintenance Phase (Week 6-8)

Aims

- Restore efficient mobility for work and community activity
- Maintain iliopsoas flexibility through self-management
- Improve endurance, walking speed, and stair performance
- Support long-term postural control
- Prepare the patient for independent home program continuation

Interventions

- Dynamic hip flexor stretching within pain-free range
- Lunge-position mobility with posterior pelvic tilt control
- Step-through gait drills emphasizing terminal hip extension
- Progressive walking distance and walking speed training
- Stair climbing with reduced hand support
- Hip hinge practice for functional bending
- Closed-chain gluteal strengthening with resistance progression
- Core stabilization in standing and kneeling positions
- Work simulation including repeated sit-to-stand and prolonged standing tolerance
- Final home program including stretching, strengthening, and movement-break planning

Goals

Short-Term Goals

1. To reduce low back discomfort and anterior hip tightness during daily activities.
2. To improve awareness of neutral pelvic alignment during standing and exercise.
3. To initiate iliopsoas stretching safely without lumbar hyperextension compensation.

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4. To improve passive hip extension and modified Thomas test position.
5. To activate gluteus maximus and abdominal muscles during simple tasks.
6. To improve sit-to-stand performance after prolonged sitting.
7. To educate the patient regarding movement breaks, posture, and home exercise adherence.

Long-Term Goals

8. To achieve functional hip extension required for walking, stair climbing, and upright posture.
9. To reduce excessive anterior pelvic tilt tendency during relaxed standing.
10. To improve walking tolerance, stride length, and gait efficiency.
11. To restore gluteal and abdominal strength to a functional level.
12. To improve stair negotiation with less anterior hip pulling and less low back discomfort.
13. To improve work-related sitting tolerance through active self-management.
14. To enable independent performance of a long-term flexibility and strengthening program.
15. To reduce recurrence risk by maintaining balanced hip mobility and lumbopelvic control.

Results

Following structured physiotherapy, the patient showed measurable improvement in pain, hip extension range, iliopsoas length, pelvic control, muscle activation, gait quality, and functional mobility. The most noticeable gains were observed when iliopsoas stretching was consistently performed with posterior pelvic tilt and gluteal activation, because this reduced lumbar substitution and allowed true hip-extension improvement.

Table 6: Range of Motion (ROM) - Hip and Lumbopelvic Region

Movement / Test	Normal ROM / Expected Finding	Pre-Rehabilitation	Post-Rehabilitation
Right hip extension	0-20 degrees	0-4 degrees with compensation	0-16 degrees with minimal compensation
Left hip extension	0-20 degrees	0-6 degrees with tightness	0-17 degrees with improved control
Modified Thomas test - right	Thigh reaches table level	Positive; thigh above table	Near negative; thigh close to table level
Modified Thomas test - left	Thigh reaches table level	Positive; mild-to-moderate tightness	Near normal position
Lumbar extension control	No excessive hinging	Excessive lumbar extension during hip movement	Improved control with neutral pelvis
Functional hip extension during gait	Adequate terminal stance	Reduced terminal extension	Improved terminal stance and step length

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Table 7: Muscle Tone Assessment - Lumbopelvic and Hip Muscles

Muscle Group	Muscle Tone Grade	Description
Iliopsoas	0-1	Minimal residual tightness with improved stretch tolerance
Rectus femoris	0-1	Mild residual tightness only at end range
Lumbar erectors	0	Reduced guarding with improved postural control
Gluteus maximus	0	Normal tone with improved functional activation
Hamstrings	0	Normal tone

Table 8: Muscle Strength Assessment - Lumbopelvic and Hip Region (MMT)

Muscle Group / Function	Pre-Rehabilitation	Post-Rehabilitation
Gluteus maximus / hip extension	Grade 3/5 with delayed activation	Grade 4+/5 with better activation
Gluteus medius / hip abduction	Grade 3+/5 with pelvic drop tendency	Grade 4+/5 with improved pelvic stability
Abdominal control / pelvic stabilization	Grade 3/5	Grade 4/5 with better posterior pelvic tilt control
Hip flexors	Grade 4/5 but shortened and overactive	Grade 4+/5 with improved length and reduced dominance
Back extensors	Grade 4/5 with dominance	Grade 4/5 with balanced contribution
Functional mobility control	Fair	Good during walking, stairs, and sit-to-stand

Table 9: Pain Assessment - NPRS Scale

Activity	Pre-Rehabilitation	Post-Rehabilitation
At rest	2/10	0/10
After prolonged sitting	7/10	2/10
During standing after sitting	6/10	1/10
During fast walking	6/10	1/10
During stair climbing	5/10	1/10
During functional exercise	6/10	2/10

Functional Improvements Observed

- The patient was able to stand more upright with less visible anterior pelvic tilt.
- Sit-to-stand improved from trunk-dominant movement to smoother hip-driven extension.
- Walking progressed from short-stride gait to a longer and more relaxed step pattern.
- Stair climbing improved with less anterior hip pulling and better gluteal use.
- Pain and stiffness after sitting reduced substantially.
- The patient reported better confidence during light exercise and community walking.

- Home exercise adherence improved after the patient understood how to control pelvic position during stretching.

Outcome Measures

Pain: Numerical Pain Rating Scale (NPRS).

Range of Motion: Goniometric assessment of hip extension and clinical assessment using modified Thomas test.

Posture: Observation of anterior pelvic tilt, lumbar lordosis behavior, standing alignment, and pelvic control during movement.

Muscle Strength: Manual Muscle Testing (MMT) of gluteal, hip, abdominal, and back extensor muscle groups.

Functional Mobility: Gait quality, sit-to-stand performance, stair climbing, walking tolerance, Timed Up and Go performance, and daily activity performance.

Discussion

The present case demonstrates that iliopsoas stretching can have a meaningful influence on posture and mobility when the intervention is performed as part of an integrated rehabilitation program. At baseline, the patient showed a typical pattern of prolonged sitting-related impairment: hip flexor tightness, increased anterior pelvic tilt tendency, lumbar extension dominance, reduced gluteal activation, and functional difficulty during walking, standing, stairs, and sit-to-stand. These impairments were interrelated rather than isolated. Tightness of the iliopsoas limited hip extension, and the patient compensated by increasing lumbar extension and pelvic anterior tilt during upright activities. Over time, this compensation appeared to contribute to low back discomfort and inefficient mobility.

One important observation in this case was that the patient had previously attempted general stretching but had not experienced lasting improvement. During clinical assessment, it became clear that the technique of stretching was a major factor. When the patient performed a lunge stretch without instruction, he increased lumbar lordosis and allowed the pelvis to tilt forward. This position created the appearance of a large stretch but did not adequately lengthen the iliopsoas. After correction using posterior pelvic tilt, gluteal contraction, abdominal control, and controlled breathing, the stretch became more specific to the anterior hip. This indicates that iliopsoas stretching for postural correction should not be taught merely as a position; it must be taught as a controlled movement with attention to the pelvis and lumbar spine.

The improvement in hip extension was clinically relevant because hip extension is necessary for efficient walking. Before rehabilitation, the patient showed reduced terminal stance and shortened stride length. The lack of hip extension forced the pelvis and lumbar spine to compensate during gait. As stretching progressed, the patient could move the hip farther behind the body with less lumbar substitution. This helped increase step length and made walking feel easier. The patient also reported less anterior hip pulling while walking fast, suggesting that improved iliopsoas length reduced the mechanical restriction during terminal stance.

Postural improvement also depended on strengthening. Iliopsoas stretching alone may temporarily improve flexibility, but if the gluteus maximus, gluteus medius, and abdominal muscles remain weak or poorly coordinated, the patient may return to the same anterior pelvic tilt posture. For this reason, the program emphasized bridging, hip-extension strengthening, side-lying abduction, standing hip extension, abdominal bracing, and functional tasks. As gluteal activation improved, the patient was better able to complete hip extension during sit-to-stand and walking without overusing the lumbar extensors. This supports the principle that mobility gains should be supported by strength and motor control.

The reduction in pain observed in this case was likely related to several mechanisms. Improved hip flexor flexibility reduced anterior hip tension and allowed more comfortable standing and walking. Better pelvic control reduced excessive lumbar extension loading. Increased gluteal activation improved force sharing between the hip and lumbar spine. Education and movement breaks reduced the repeated daily exposure to prolonged hip flexion. These changes may have interrupted the cycle of tightness, guarding, compensatory posture, and pain. The patient also became more confident because he could understand the reason behind his symptoms and perform the corrective exercises independently.

The case also highlights the clinical importance of functional integration. If stretching is performed only in lying or kneeling but not carried into walking, transfers, and stairs, the improvement may remain limited to the treatment session. In this program, stretching was followed by gait drills, sit-to-stand retraining, step-ups, stair practice, and work-simulation activities. This allowed the patient to use the newly available hip extension in real tasks. The improvement in sit-to-stand was particularly important because the patient experienced symptoms when rising after prolonged sitting. By learning to control the pelvis and activate the gluteals during the final phase of standing, he reduced lumbar extension compensation and anterior hip pulling.

Another important finding was the influence of education and adherence. The patient initially believed that posture could be corrected simply by forcing himself to stand straight. This strategy increased lumbar extension and discomfort. After education, he learned that upright posture should come from a balanced pelvis, active hips, and controlled trunk rather than rigid back extension. He also learned to take movement breaks during work, perform brief hip-extension mobility drills, and avoid remaining in a flexed sitting posture for long periods. These behavioral changes likely contributed to the sustainability of the improvement.

The outcome of this case should be interpreted with appropriate caution. The improvements cannot be attributed to iliopsoas stretching alone because the program included strengthening, postural retraining, gait correction, and ergonomic advice. However, iliopsoas stretching was the central component because it addressed the primary mobility restriction and provided the foundation for improved alignment and movement. The case therefore suggests that iliopsoas stretching is most effective when it is specific, controlled, repeated, and integrated into functional rehabilitation.

Overall, the case supports a practical clinical approach for patients with anterior pelvic tilt tendency, lumbar extension dominance, and mobility restriction related to hip flexor tightness. Assessment should include hip extension range, modified Thomas test, observation of pelvic control, gluteal

activation, and functional tasks. Treatment should combine targeted stretching with motor control and strengthening. Progress should be judged not only by the degree of stretch achieved but by the patient's ability to stand, walk, climb stairs, and perform work activities with less pain and better movement quality.

Limitations of the Study

- This is a single-patient case study, so the findings cannot be generalized to all patients with postural and mobility problems.
- The report does not include a randomized comparison group or blinding.
- Postural alignment was assessed clinically and was not confirmed through three-dimensional motion analysis.
- The observed effect reflects a combined program of stretching, strengthening, education, and functional retraining.
- Long-term follow-up beyond 8 weeks was not included.
- Workstation habits and home exercise adherence may have influenced the outcome.

Conclusion

In this case study, iliopsoas stretching produced a positive effect on posture and mobility when combined with lumbopelvic control, gluteal strengthening, abdominal stabilization, gait retraining, and patient education. The patient showed improvement in hip extension range, modified Thomas test position, anterior pelvic tilt control, pain after sitting, walking comfort, sit-to-stand performance, stair climbing, and functional confidence. The findings suggest that iliopsoas tightness can contribute to postural and mobility limitations, especially in adults exposed to prolonged sitting and reduced hip-extension activity.

The case also shows that stretching must be performed correctly. A hip flexor stretch done with excessive lumbar extension may reinforce the same compensation that contributes to the problem. When posterior pelvic tilt, gluteal contraction, abdominal control, and controlled breathing were used, the patient was able to direct the stretch toward the iliopsoas and improve functional hip extension. Therefore, iliopsoas stretching should be considered not as an isolated flexibility exercise but as part of a complete physiotherapy program that restores movement quality and daily functional performance.

Future Scope of the Study

Future studies should include larger samples and compare iliopsoas stretching alone with combined stretching, strengthening, and postural retraining programs. Standardized outcome tools such as the Oswestry Disability Index, Patient-Specific Functional Scale, Timed Up and Go test, 10-meter walk test, six-minute walk test, digital inclinometry for pelvic tilt, and three-dimensional gait analysis may provide stronger evidence regarding the effect of iliopsoas stretching on posture and mobility.

Longer follow-up periods are also required to determine whether improvements in hip extension and pelvic control are maintained after discharge.

Further research may also examine different stretching methods, including static stretching, hold-relax proprioceptive neuromuscular facilitation, muscle energy technique, active dynamic stretching, and yoga-based lunge variations. The role of sitting duration, occupation, age, physical activity level, gluteal weakness, core endurance, and ergonomic behavior should also be evaluated. Such research may help clinicians identify which patients benefit most from iliopsoas-focused rehabilitation and how stretching dosage should be prescribed for long-term postural and functional improvement.

References

1. Neumann DA. Kinesiology of the Musculoskeletal System: Foundations for Rehabilitation. 3rd ed. St Louis: Elsevier; 2017.
2. Kendall FP, McCreary EK, Provance PG, Rodgers MM, Romani WA. Muscles: Testing and Function with Posture and Pain. 5th ed. Baltimore: Lippincott Williams & Wilkins; 2005.
3. Magee DJ. Orthopedic Physical Assessment. 6th ed. St Louis: Elsevier Saunders; 2014.
4. Norkin CC, White DJ. Measurement of Joint Motion: A Guide to Goniometry. 5th ed. Philadelphia: F.A. Davis; 2016.
5. Kisner C, Colby LA, Borstad J. Therapeutic Exercise: Foundations and Techniques. 7th ed. Philadelphia: F.A. Davis; 2017.
6. Preece SJ, Tan YF, Alghamdi TDA, Arnall FA. Comparison of pelvic tilt before and after hip flexor stretching in healthy adults. J Manipulative Physiol Ther. 2021;44(4):289-294.
7. Watt JR, Jackson K, Franz JR, Dicharry J, Evans J, Kerrigan DC. Effect of a supervised hip flexor stretching program on gait in frail elderly patients. PM R. 2011;3(4):330-335.
8. Konrad A, Mocnik R, Titze S, Nakamura M, Tilp M. The influence of stretching the hip flexor muscles on performance parameters: a systematic review with meta-analysis. Int J Environ Res Public Health. 2021;18(4):1936.
9. Lakkadsha TM, Qureshi MI, Kovela RK, Saifee SS, Lalwani SS. Efficacy of single stretching session of iliopsoas using proprioceptive neuromuscular facilitation versus muscle energy technique on low back pain in patients with lumbar hyper-lordosis. Cureus. 2022;14(8):e27916.
10. Malai S, Pichaiyongwongdee S, Sakulsriprasert P. Immediate effect of hold-relax stretching of iliopsoas muscle on transversus abdominis muscle activation in chronic non-specific low back pain with lumbar hyperlordosis. J Med Assoc Thai. 2015;98 Suppl 5:S6-S11.
11. Vigotsky AD, Lehman GJ, Beardsley C, Contreras B, Chung B, Feser EH. The modified Thomas test is not a valid measure of hip extension unless pelvic tilt is controlled. PeerJ. 2016;4:e2325.
12. Garber CE, Blissmer B, Deschenes MR, Franklin BA, Lamonte MJ, Lee IM, et al. Quantity and quality of exercise for developing and maintaining cardiorespiratory, musculoskeletal, and neuromotor fitness in apparently healthy adults: guidance for prescribing exercise. Med Sci Sports Exerc. 2011;43(7):1334-1359.