

Effects of Glute Activation Exercises on Low Back Pain in Office Workers with Gluteal Amnesia: Case Study

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Abstract

Background: Low back pain is highly common among office workers because prolonged sitting, low physical activity, poor lumbopelvic control, and repetitive static postures place sustained mechanical demand on the lumbar spine. Gluteal amnesia refers to delayed, reduced, or poorly coordinated activation of the gluteus maximus and gluteus medius during hip extension, pelvic stabilization, gait, squatting, stair climbing, and sit-to-stand activity. When the gluteal muscles fail to contribute efficiently, the lumbar extensors, hamstrings, tensor fascia lata, and hip flexors may compensate, leading to increased lumbar loading, anterior pelvic tilt, altered hip mechanics, and recurrent pain. Glute activation exercises are used to restore neuromuscular awareness, improve hip extension strategy, enhance pelvic control, and reduce unnecessary lumbar overuse during functional movement.

Presentation of Cases: This case study presents two adult office workers with mechanical low back pain and clinical features consistent with gluteal amnesia. Both worked more than seven hours daily in sitting, reported repeated episodes of pain after prolonged computer work, and demonstrated weak or delayed glute activation during prone hip extension, bridge holding, single-leg support, and sit-to-stand assessment. Case A presented with dominant gluteus maximus inhibition, hamstring overactivity, and extension-related lumbar discomfort. Case B presented with gluteus medius weakness, pelvic drop, dynamic knee valgus, and pain during stairs and prolonged standing. Both cases were medically stable and participated in a six-week supervised physiotherapy programme with progressive home practice.

Intervention: The intervention included education regarding sitting breaks and neutral spine awareness, low-load glute setting, supine bridge progression, prone hip extension with abdominal bracing, clamshells, side-lying hip abduction, band-resisted lateral walk, quadruped hip extension, hip hinge training, sit-to-stand retraining, step-up control, and work-related movement practice. Exercise intensity was progressed according to pain response, quality of activation, endurance, and ability to avoid lumbar substitution. Both cases were monitored for symptom irritability and fatigue.

Outcome Measures: Pain intensity, disability, strength, activation timing, movement control, and work tolerance were documented using the Numeric Pain Rating Scale, Oswestry Disability Index, manual muscle testing of gluteus maximus and medius, prone hip extension

observation, single-leg bridge endurance, Trendelenburg assessment, sit-to-stand quality, sitting tolerance record, and a therapist-maintained functional task log.

Results: At six weeks both office workers showed reduction in pain, improvement in gluteal strength, better pelvic control, and increased tolerance for sitting and daily activity. Case A improved markedly in hip extension pattern, bridge endurance, and reduction of lumbar extensor dominance. Case B showed stronger improvement in frontal-plane pelvic stability, stair confidence, and single- leg control. Pain decreased from moderate-severe to mild levels in both cases, and disability shifted from moderate limitation to minimal functional restriction. The greatest functional changes were noted in prolonged sitting, rising from a chair, walking after office hours, stair use, and confidence during household activity.

Conclusion: Glute activation exercises were associated with meaningful improvement in low back pain, hip muscle performance, and functional tolerance in office workers with gluteal amnesia. The findings support a progressive programme that begins with isolated neuromuscular activation and advances toward task-based hip control.

Keywords: Low back pain, office workers, gluteal amnesia, glute activation exercises, gluteus maximus, gluteus medius, lumbopelvic control, physiotherapy, ergonomic education.

Background

Low back pain is one of the most frequent musculoskeletal complaints among people who perform desk-based work. Office employees usually spend long periods sitting in front of a computer, attending meetings, using mobile devices, and commuting in the same flexed posture. This routine reduces the natural variation of spinal loading and can create persistent stiffness around the hip flexors, thoracolumbar fascia, hamstrings, and posterior chain. Pain may begin as mild discomfort after a long working day, but it often becomes recurrent when the underlying movement pattern is not corrected. In many office workers, the problem is not only weakness but poor timing and poor awareness of the hip muscles that should support the pelvis during movement.

Gluteal amnesia is a clinical term used to describe reduced recruitment of the gluteal muscles during tasks in which they should be active. The gluteus maximus is the primary hip extensor and contributes to posterior pelvic control, trunk support, force generation during sit-to-stand, stair climbing, lifting, running, and gait propulsion. The gluteus medius and minimus provide frontal- plane pelvic control and prevent excessive pelvic drop during single-leg stance. When these muscles remain underactive after prolonged sitting or repeated poor posture, the body often substitutes with lumbar paraspinals, hamstrings, quadratus lumborum, tensor fascia lata, and hip adductors. This compensation can produce excessive lumbar extension, anterior pelvic tilt, rotation stress, or side- bending during daily movements.

The relationship between hip muscle function and low back pain is clinically important because the lumbar spine and pelvis work as one functional unit. Good lumbar stability does not depend only on abdominal strength; it also requires appropriate hip mobility, hip strength, motor control, and coordinated muscle timing. If the hip extensors are weak or late, the lumbar extensors may initiate movement during prone hip extension, bridging, squatting, or rising

from a chair. Similarly, if the gluteus medius is weak, the pelvis may drop during standing and walking, increasing asymmetrical loading across the lumbar spine and sacroiliac region. Repeated exposure to these altered patterns can maintain pain even when rest, medication, or passive modalities provide temporary relief.

Office workers are particularly vulnerable to this pattern because sitting places the hips in flexion for several hours. Prolonged hip flexion can increase hip flexor tightness, reduce posterior chain engagement, and encourage a slumped or anteriorly tilted pelvis depending on workstation setup and fatigue. The gluteal muscles are not asked to generate force while sitting, so the nervous system may gradually reduce their automatic involvement in functional tasks. When the person suddenly stands, climbs stairs, bends to pick an object, or walks after long sitting, the lumbar spine may compensate for the inactive hip muscles. This explains why many office workers report pain during the first few steps after sitting, during prolonged standing, or while returning home after work.

Glute activation exercises aim to restore the connection between the nervous system and the hip stabilizing muscles. The early stage commonly includes low-load exercises that help the patient feel the gluteal contraction without cramping in the hamstrings or excessive arching of the lower back. As control improves, exercises are progressed to bridges, clamshells, side-lying hip abduction, quadruped hip extension, band walking, hip hinge drills, squats, step-ups, and functional movement practice. The emphasis is not on heavy strengthening alone. The therapist must ensure that the patient can activate the correct muscle, maintain neutral pelvis, breathe normally, avoid lumbar substitution, and transfer the pattern to daily activity. In low back pain management, patient education is also essential. A person may complete exercises in the clinic yet return to eight hours of static sitting, poor chair height, low monitor position, and no movement breaks. Therefore, glute activation must be linked with workstation correction, brief standing breaks, walking during calls, controlled sit-to-stand practice, and avoidance of end-range slumped sitting. This combined approach is useful because the pain mechanism in office workers is usually maintained by repeated exposure to the same posture and movement habits. Exercises become more effective when they are supported by behavioural and ergonomic changes.

The present case study examines two office workers with low back pain and gluteal amnesia who were treated with progressive glute activation exercises. The purpose is to describe clinical presentation, assessment findings, physiotherapy management, functional changes, and outcome response over six weeks. The sequence follows a standard case-study format including background, clinical presentation, examination findings, intervention, goals, results, discussion, conclusion, future scope, and references. The focus is on how glute activation influenced pain, disability, muscle performance, and work-related tolerance in desk-based adults.

Epidemiology and Clinical Relevance: Low back pain affects productivity, sitting tolerance, sleep quality, physical activity, and quality of life in working adults. Office workers frequently continue working despite pain, which can lead to repeated flare-ups, reduced concentration, increased absenteeism, and reliance on pain medicines. Because gluteal weakness and

delayed hip control are modifiable factors, early physiotherapy intervention may reduce recurrence and improve long-term self-management.

Scope of the Study: This case study focuses on two office workers with mechanical low back pain, prolonged sitting exposure, and clinical signs of gluteal amnesia. It examines pain, disability, hip muscle strength, activation timing, pelvic stability, sitting tolerance, and functional task performance over a six-week glute activation exercise programme.

Clinical Presentation

Patient Data

Case A (Focused Gluteus Maximus Activation Programme) was a 34-year-old male software developer who worked approximately eight to nine hours per day in sitting. He reported a nine-month history of recurrent central and right-sided low back pain, aggravated by prolonged sitting, driving, bending to lift a laptop bag, and rising after long coding sessions. Pain was relieved temporarily by lying supine, walking for a short distance, and using heat. He did not report radiating pain below the knee, numbness, bowel or bladder symptoms, unexplained weight loss, fever, or night pain. His main complaint was a feeling of stiffness and heaviness in the lower back after office hours. He noticed that his hamstrings cramped during bridges and that he was unable to feel the buttock muscles working during exercise.

Case B (Gluteus Medius and Functional Hip-Control Programme) was a 41-year-old female accounts manager who worked seven to eight hours daily in sitting and spent additional time commuting. She reported a six-month history of intermittent low back pain more prominent on the left side, with discomfort during stair climbing, prolonged standing, walking in malls after office hours, and carrying grocery bags. She described a sense of pelvic drop and poor balance while standing on one leg to wear footwear. Pain was non-radicular and mechanical in nature. Her workstation history revealed a low chair, frequent forward bending toward the laptop, limited walking breaks, and prolonged sitting during month-end financial reporting. Both cases had sedentary work routines, low weekly exercise participation, and no history of recent trauma. Both were medically stable, had normal neurological screening, and were suitable for active physiotherapy. They were instructed regarding red flags and safe exercise performance before beginning the programme. Baseline assessment was performed at the first visit, reassessment was carried out at week three, and final assessment was completed at week six.

Inclusion Criteria Applied to Both Cases: adult office workers aged 25 to 50 years; mechanical low back pain for more than three months; pain aggravated by prolonged sitting or work-related posture; clinical signs of reduced glute activation; ability to understand instructions; no acute neurological deficit; willingness to complete supervised sessions and home practice.

Exclusion Criteria Considered: lumbar radiculopathy with progressive neurological deficit, spinal fracture, inflammatory spinal disease, recent spinal surgery, pregnancy-related back pain, severe hip pathology, uncontrolled systemic illness, severe balance disorder, and pain intensity that prevented active exercise participation.

Clinical Examination and Findings

A structured physiotherapy examination was conducted for both patients. Observation included standing posture, lumbar curve, pelvic alignment, hip position, knee alignment, foot posture, and movement strategy during sit-to-stand and forward bending. Palpation examined lumbar paraspinal tone, tenderness around the sacroiliac region, gluteal muscle bulk, and hip flexor tightness. Active lumbar movements were assessed for pain, range, quality, and deviation. Hip range of motion, hip flexor length, hamstring flexibility, gluteal strength, abdominal control, and functional lower limb alignment were documented.

Special attention was given to the pattern of muscle activation during prone hip extension. In a desirable sequence, gluteus maximus and hamstrings contribute to hip extension while lumbar paraspinal activity remains controlled. In both cases, the lumbar extensors were seen to activate early, with delayed buttock contraction. Case A showed visible lumbar arching and hamstring cramping during hip extension and bridging. His bridge height increased when he pushed through the heels, but palpation showed poor gluteal contraction and excessive spinal extension. He also demonstrated reduced hip extension mobility, tight rectus femoris and iliopsoas, and discomfort during repeated sit- to-stand when asked to avoid using his hands.

Case B demonstrated better sagittal-plane hip extension than Case A but showed prominent frontal- plane control deficits. During single-leg stance on the left side, the pelvis dropped and the trunk leaned laterally. During step-down testing, the knee moved inward and the pelvis rotated. Side-lying hip abduction was weak and was substituted by hip flexion and tensor fascia lata dominance. Clamshell performance was initially difficult because she rolled the pelvis backward to gain range. Her pain was reproduced during stair simulation and prolonged static standing, suggesting inadequate lateral hip control during weight-bearing tasks.

Neurological screening was normal in both cases. Straight leg raise did not reproduce radicular symptoms. Slump test was negative. Lumbar repeated movement testing did not show a clear directional preference. The clinical impression was mechanical low back pain associated with poor gluteal activation, hip muscle weakness, hip flexor tightness, excessive lumbar compensation, and reduced work-related movement variation.

Table 1: Baseline Demographic and Occupational Profile

Variable	Case A - Gluteus Maximus Focus	Case B - Gluteus Medius Focus
Age / Sex	34 / Male	41 / Female
Occupation	Software developer	Accounts manager
Daily sitting exposure	8-9 hours	7-8 hours
Pain duration	9 months	6 months
Pain distribution	Central and right-sided lumbar pain	Left-sided lumbar and sacroiliac region pain
Aggravating factors	Sitting, driving, bending, rising from chair	Stairs, prolonged standing, carrying bags, long sitting

Physical activity level	Low; irregular walking	Low; occasional weekend walking
Neurological symptoms	Absent	Absent

Table 2: Baseline Lumbar and Hip Examination Findings

Examination Component	Case A Pre	Case B Pre	Clinical Meaning
Lumbar flexion	Fingertips to mid-shin with stiffness	Fingertips to lower shin with mild pain	Reduced mobility and protective movement
Lumbar extension	Painful end range with hinging	Mild discomfort, poor control	Lumbar substitution present
Hip extension range	0-6 degrees bilaterally	0-10 degrees left, 0-12 degrees right	Hip flexor tightness influencing pelvis
Thomas test	Positive bilaterally	Positive left more than right	Hip flexor shortening
Hamstring flexibility	Moderate tightness with cramp tendency	Mild to moderate tightness	Posterior chain stiffness
Single-leg stance	Right pelvis unstable	Left pelvic drop after 8	Poor hip stabilizer
Examination Component	Case A Pre	Case B Pre	Clinical Meaning
	after 12 seconds	seconds	endurance
Prone hip extension sequence	Lumbar paraspinals first, delayed gluteus maximus	Hamstring and lumbar activity before gluteal activity	Gluteal amnesia pattern

Table 3: Muscle Activation and Strength Assessment

Muscle / Test	Case A	Case B	Description
Gluteus maximus MMT	3-/5	3+/5	Hip extension force reduced
Gluteus medius MMT	3/5	3-/5	Pelvic control weakness
Prone hip extension palpation	Delayed, poor bulk contraction	Delayed but present with cueing	Reduced neuromuscular recruitment
Single-leg bridge hold	8 seconds with hamstring cramp	10 seconds with pelvic drop	Endurance deficit
Side plank from knees	16 seconds	12 seconds	Lateral trunk-hip endurance reduced
Abdominal bracing control	Fair but inconsistent	Fair with breath holding	Core-hip coordination needs training

Table 4: Baseline Functional and Pain Measures

Outcome Measure	Case A Pre	Case B Pre	Clinical Meaning
Pain NPRS during workday	7/10	6/10	Moderate-severe symptoms
Oswestry Disability Index	38%	34%	Moderate disability

Sitting tolerance before pain increase	35 minutes	45 minutes	Reduced work tolerance
Sit-to-stand repetitions in 30 seconds	9	10	Functional strength and control reduced
Functional task log /20	7	8	Limited daily use of hip- control strategies
Patient-specific function score /30	13	14	Restricted chosen activities

UNIQUE FEATURES OF THE STUDY

This case study is distinctive because it links a common work-related complaint with a specific modifiable movement impairment: poor gluteal activation. Instead of focusing only on pain relief, the intervention monitored how office workers learned to use the gluteus maximus and gluteus medius during real activities. The cases also show two different presentations of the same broad problem. Case A required more attention to hip extension and reduction of lumbar extensor dominance, whereas Case B required more lateral hip control and pelvic stability during weight-bearing tasks. The programme therefore demonstrates how glute activation can be progressed from isolated awareness to functional transfer.

Investigations and Findings

Both patients had previously consulted a physician for non-specific mechanical low back pain. No red-flag features were present during physiotherapy screening. Routine medical advice had included posture correction, short-term analgesic use when pain was severe, and encouragement to remain active. Imaging was not considered essential for exercise planning because symptoms were mechanical, neurological examination was normal, and no serious pathology was suspected. Clinical assessment, functional testing, and response to movement were the main bases for physiotherapy management.

The main finding in both cases was altered hip-lumbar coordination rather than isolated spinal limitation. Tight hip flexors, reduced gluteal strength, poor endurance, and delayed activation created a pattern in which the lumbar spine performed work that should have been shared by the hips. Both patients could reduce symptoms temporarily by walking or changing position, confirming that static sitting and poor muscle recruitment were important contributors. These findings supported the use of active rehabilitation instead of passive treatment alone.

Table 5: Summary of Relevant Medical and Functional Findings

Investigation / Finding	Case A	Case B
Medical diagnosis	Mechanical low back pain	Mechanical low back pain
Neurological screening	Normal myotomes, dermatomes, and reflexes	Normal myotomes, dermatomes, and reflexes
Radicular signs	Absent	Absent
Primary movement fault	Lumbar extension substitution during hip extension	Pelvic drop and femoral internal rotation during single-leg tasks
Dominant inhibited muscle	Gluteus maximus	Gluteus medius

Dominant compensation	Hamstring cramp and lumbar extensor overactivity	Tensor fascia lata dominance and lateral trunk lean
Workplace contributor	Long coding sessions without breaks	Low chair, laptop flexion, deadline sitting
Exercise tolerance	Adequate with low-load start	Adequate with careful progression

Physiotherapy Management

Treatment lasted six weeks, with five supervised sessions per week of approximately forty-five minutes and a structured home programme. Session frequency was selected to reinforce correct activation in the early phase and prevent repeated substitution. Each session began with symptom review, pain scoring, sitting tolerance update, and brief movement reassessment. Exercise was stopped or modified if pain increased beyond a mild and acceptable level, if hamstring cramping dominated, or if the patient lost pelvic control. Both patients received education about posture variation, frequent micro-breaks, use of chair support, correct monitor height, and walking for two to three minutes after every thirty to forty minutes of sitting.

The treatment principle was to progress from awareness to endurance, then from endurance to functional integration. The first stage focused on finding the target muscle without compensation. The second stage increased repetitions, hold time, and resistance while maintaining a neutral pelvis. The third stage trained work-related tasks such as rising from a chair, walking after sitting, lifting a laptop bag, climbing stairs, and controlled hip hinge. Breathing, abdominal bracing, and slow movement quality were emphasized throughout. The therapist used palpation, verbal cues, mirror feedback, tactile tapping, and self-monitoring to help each patient recognize correct gluteal activation.

Focused Gluteus Maximus Activation Programme for Case A

Phase I: Pain Control, Awareness, and Hip Extension Preparation (Week 1-2). The early focus was on reducing lumbar guarding and helping the patient identify a gluteus maximus contraction without hamstring cramping. The session included diaphragmatic breathing, pelvic clock movements, gentle hip flexor stretching, prone glute sets with pillow support under the abdomen, hook-lying glute squeezes, low bridge initiation, and heel-pressure cueing. The patient was instructed not to arch the lower back during exercise. Palpation over the gluteal region was used so that he could differentiate buttock contraction from hamstring or lumbar effort. Sitting breaks and lumbar roll use were introduced from the first week.

Phase II: Endurance, Bridge Control, and Hip Hinge Relearning (Week 2-4). After the patient could produce a visible and palpable glute contraction, exercises were progressed to double-leg bridges with three to five second holds, bridge with mini-band abduction, prone hip extension with knee flexed to reduce hamstring dominance, quadruped hip extension, dead bug with glute set, and supported hip hinge. The therapist monitored for lumbar extension, rib flare, and breath holding. Sit- to-stand practice was performed with a hip hinge strategy, feet grounded, and controlled glute contraction during the rising phase. The home programme included short sets performed twice daily rather than one long fatiguing session.

Phase III: Functional Strengthening and Work-Related Transfer (Week 4-6). Treatment progressed to resisted hip extension with band, split-stance bridge, step-up with hip drive, farmer carry with neutral spine, wall-supported squat, loaded hip hinge using a light bag, and timed walking after sitting. The patient practiced standing from his office chair without lumbar thrust and bending to lift a laptop bag using hip-dominant mechanics. The final stage emphasized automatic activation during daily tasks rather than conscious squeezing during every movement. He was advised to continue micro-breaks, walking, and three maintenance exercise sessions per week after discharge.

Gluteus Medius and Functional Hip-Control Programme for Case B

Phase I: Lateral Hip Awareness and Pelvic Positioning (Week 1-2). The early programme addressed pelvic drop and tensor fascia lata substitution. Exercises included side-lying clamshell with the pelvis stabilized, side-lying hip abduction in slight extension, isometric wall press, mini-bridge with band cue, hip flexor stretching, and supported single-leg stance with mirror feedback. The patient was taught to keep the pelvis level and avoid rolling the trunk backward during clamshells. Low repetitions were used initially because fatigue quickly caused substitution. Workstation correction included raising the laptop screen, using a chair that allowed hip and knee angles close to ninety degrees, and setting alarms for movement breaks.

Phase II: Closed-Chain Pelvic Control and Repetition Practice (Week 2-4). Once the patient could activate the lateral hip muscles with reduced compensation, treatment progressed to mini- squats with band, lateral weight shifts, side stepping with light resistance, step-up control, controlled step-down from a low step, single-leg stance reach, and sit-to-stand with knee alignment feedback. The therapist used a mirror and tactile cues at the pelvis to reduce hip drop and knee valgus. The patient practiced short bouts of stair simulation because stair climbing was one of her main functional complaints.

Phase III: Functional Endurance, Stair Confidence, and Carryover (Week 4-6). The final phase included band-resisted lateral walks, higher step-ups, diagonal reaching in single-leg stance, suitcase carry with light load, controlled stair ascent and descent, hip hinge with frontal-plane control, and walking drills after prolonged sitting. Home tasks were linked with daily routines, such as standing on one leg with support while wearing footwear, using stairs with controlled knee alignment, and walking for two minutes between work blocks. Progression depended on pelvic stability, pain response, and ability to complete repetitions without breath holding or trunk leaning.

Table 6: Comparative Summary of Intervention Content

Rehabilitation Element	Case A - Gluteus Maximus Focus	Case B - Gluteus Medius Focus
Main therapeutic emphasis	Hip extension activation, reduced lumbar substitution, bridge and hinge control	Pelvic stability, lateral hip endurance, stair and single-leg control
Early exercise priority	Prone glute set, low bridge, hip flexor stretch	Clamshell, side-lying abduction, wall press, supported single-leg stance

Main compensation controlled	Hamstring cramp and lumbar arching	Tensor fascia lata dominance, pelvic drop, knee valgus
Feedback style	Palpation, verbal cueing, slow controlled repetition	Mirror feedback, tactile pelvic cueing, alignment correction
Functional progression	Sit-to-stand, lifting laptop bag, hip hinge, walking after sitting	Step-up, stair practice, carrying bags, single-leg standing
Home programme	Short repeated activation sets and chair-rise practice	Lateral hip control drills and stair-related practice

Goals

Short-Term Goals

1. To reduce pain intensity, fear of movement, and protective lumbar guarding during daily activities.
2. To improve awareness of gluteus maximus and gluteus medius contraction without excessive hamstring, tensor fascia lata, or lumbar substitution.
3. To improve neutral pelvic position during low-load activation exercises.
4. To increase hip flexor flexibility and reduce anterior pelvic tilt influence during standing and walking.
5. To improve bridge tolerance, side-lying hip abduction control, and supported single-leg stance.
6. To educate both patients about sitting breaks, workstation correction, safe exercise performance, and self-monitoring of symptoms.

Long-Term Goals

7. To reduce work-related low back pain and improve sitting tolerance during office duties.
8. To increase gluteal strength and endurance during functional movements such as sit-to-stand, walking, stair use, and lifting light objects.
9. To improve lumbopelvic control and reduce repeated lumbar compensation during hip-dominant activity.
10. To improve confidence in prolonged standing, commuting, stair climbing, and household tasks.
11. To reduce recurrence risk through an independent maintenance exercise programme.
12. To establish sustainable ergonomic and movement habits for long-term self-management.

Results

Both patients completed the six-week programme without adverse events. Attendance was above ninety percent, and home-practice adherence was satisfactory according to the exercise log. The first two weeks produced the greatest change in symptom awareness and movement quality. By week three, both patients reported less pain after sitting and greater confidence in performing exercises without provoking symptoms. By week six, the improvements were reflected in pain scores, disability percentage, muscle strength, activation timing, endurance, and work tolerance.

Case A showed the strongest improvement in gluteus maximus activation and reduction of lumbar substitution. His hamstring cramping during bridge exercises reduced by the end of week two and disappeared during controlled bridge sets by week four. He could rise from a chair with less spinal extension and could lift a laptop bag with a hip hinge strategy. Case B showed the greatest improvement in pelvic stability, single-leg stance, stair performance, and control of knee alignment. She reported less discomfort while climbing stairs and was able to stand for longer periods during office presentations.

Table 7: Mid-Programme and Post-Programme Pain and Disability Scores

Time Point	Case A - Pain NPRS	Case A - ODI	Case B - Pain NPRS	Case B - ODI
Baseline	7/10	38%	6/10	34%
Week 3	4/10	24%	3/10	22%
Week 6	2/10	12%	1-2/10	10%
Total Change	5-point reduction	26% improvement	About 4-5 point reduction	24% improvement

Table 8: Glute Activation and Functional Endurance Performance

Measure	Case A Pre	Case A Post	Case B Pre	Case B Post
Gluteus maximus MMT	3-/5	4/5	3+/5	4+/5
Gluteus medius MMT	3/5	4-/5	3-/5	4/5
Single-leg bridge hold	8 seconds	28 seconds	10 seconds	30 seconds
Side plank from knees	16 seconds	32 seconds	12 seconds	35 seconds
Measure	Case A Pre	Case A Post	Case B Pre	Case B Post
Prone hip extension sequence	Lumbar first	Gluteal activation earlier with controlled lumbar spine	Lumbar/hamstring first	Improved gluteal timing with mild cueing
Sitting tolerance	35 minutes	95 minutes with breaks	45 minutes	110 minutes with breaks

Table 9: Strength, Flexibility, and Movement Control Changes

Variable	Case A Pre	Case A Post	Case B Pre	Case B Post
Hip extension range	0-6 degrees	0-15 degrees	0-10/12 degrees	0-18 degrees
Thomas test	Positive, marked tightness	Mild residual tightness	Positive left more than right	Minimal tightness
Sit-to-stand in 30 seconds	9 reps	14 reps	10 reps	16 reps

Single-leg stance control	12 seconds unstable	30 seconds with mild sway	8 seconds pelvic drop	30 seconds controlled
Step-down quality	Lumbar extension strategy	Improved hip hinge control	Pelvic drop and knee valgus	Improved alignment with confidence
Functional task log /20	7	16	8	17

Table 10: Final Functional Comparison

Movement / Activity	Case A Post	Case B Post	Clinical Interpretation
Chair rise after sitting	Able with hip hinge and minimal pain	Able with good knee alignment	Workday transitions improved
Walking after office hours	Pain reduced and stride improved	Pain minimal with better pelvic control	Hip activation supported mobility
Stair climbing	Improved but slower with fatigue	Markedly improved with confidence	Case B gained more in stair-specific control
Laptop or bag lifting	Improved hip hinge and load control	Improved but still cautious with heavier loads	Case A gained more in hip extension strategy
Prolonged sitting	Tolerated longer with scheduled breaks	Tolerated longer with workstation changes	Ergonomic carryover was important
Self-management confidence	Good understanding of activation cues	Good understanding of lateral hip control cues	Both suitable for independent maintenance

Outcome Measures

Pain intensity was recorded using the Numeric Pain Rating Scale. Disability was measured using the Oswestry Disability Index.

Gluteus maximus and gluteus medius strength were assessed through manual muscle testing. Activation quality was observed using prone hip extension sequence, bridge performance, and palpation-based awareness.

Pelvic stability was assessed using Trendelenburg observation, single-leg stance, step-down quality, and frontal-plane knee alignment.

Functional endurance was monitored using single-leg bridge holding time, side plank from knees, sit- to-stand repetitions, and sitting tolerance record.

Work-related function was documented with a therapist-maintained task log including chair rise, walking after sitting, stair use, light lifting, prolonged standing, and self-reported confidence during office activities.

Discussion

The findings show that progressive glute activation exercises reduced low back pain and improved work-related function in both office workers. The main benefit appeared to come from restoring hip contribution during movements that were previously dominated by lumbar extension, hamstring overactivity, or lateral trunk compensation. Case A improved most in gluteus maximus recruitment, bridge endurance, hip hinge control, and chair-rise mechanics, suggesting that hip extension retraining reduced unnecessary lumbar loading. Case B improved most in gluteus medius strength, single-leg stance, step-down control, and stair confidence, indicating better pelvic stability during weight-bearing tasks. Pain reduction was supported not only by exercise but also by sitting breaks, workstation changes, and awareness of movement quality. The findings also show that gluteal amnesia is not identical in every patient. Some office workers need posterior-chain activation, whereas others need lateral hip control. Therefore, assessment should identify the dominant compensation before exercise selection. A practical rehabilitation programme should begin with isolated activation, progress to endurance and resistance, and finally integrate glute control into sitting, standing, walking, stair climbing, and lifting tasks. Careful cueing, gradual loading, and workplace carryover appear essential for lasting improvement.

Limitations of the Study

- Only two office workers were included, so the findings cannot be generalized to all patients with low back pain.
- The cases had similar work exposure but differed in age, sex, symptom duration, and dominant gluteal impairment.
- Electromyography was not used, so activation timing was assessed clinically by observation and palpation.
- The follow-up period was limited to six weeks and did not confirm long-term recurrence prevention.
- Workstation compliance and home-practice quality depended partly on patient self-report.
- Psychosocial contributors such as stress, sleep, workload pressure, and fear avoidance were not measured in detail.

Conclusion

Glute activation exercises reduced low back pain, improved hip strength, and increased work tolerance in both office workers with gluteal amnesia. A programme combining isolated activation, progressive strengthening, pelvic control, ergonomic correction, and functional task practice appears useful for restoring lumbopelvic control and reducing recurrence risk.

Future Scope of the Study

Future research should include larger groups of office workers with clearly defined clinical subtypes of gluteal amnesia. Participants may be stratified according to dominant gluteus maximus inhibition, dominant gluteus medius weakness, hip flexor tightness, sitting

exposure, pain duration, and baseline disability. This would help identify which patients respond best to each type of glute activation exercise.

Long-term follow-up is needed to determine whether improvement in glute activation reduces recurrence after patients return to full work routines. Future studies may include electromyography, pressure biofeedback, wearable posture sensors, sitting-time tracking, and objective workplace activity monitoring. Comparative protocols may also examine glute activation alone, glute activation with ergonomic correction, and glute activation combined with core stabilization. Patient-reported outcomes such as fear of movement, work productivity, confidence, and quality of life should be included to provide a more complete view of recovery.

References

1. Hodges PW, Richardson CA. Inefficient muscular stabilization of the lumbar spine associated with low back pain. *Spine*. 1996;21(22):2640-2650.
2. Nadler SF, Malanga GA, DePrince M, Stitik TP, Feinberg JH. The relationship between lower extremity injury, low back pain, and hip muscle imbalance in athletes. *Am J Phys Med Rehabil*. 2000;79(6):505-513.
3. Cooper NA, Scavo KM, Strickland KJ, Tipayamongkol N, Nicholson JD, Bewyer DC, et al. Prevalence of gluteus medius weakness in people with chronic low back pain compared to healthy controls. *Eur Spine J*. 2016;25(4):1258-1265.
4. Distefano LJ, Blackburn JT, Marshall SW, Padua DA. Gluteal muscle activation during common therapeutic exercises. *J Orthop Sports Phys Ther*. 2009;39(7):532-540.
5. Selkowitz DM, Beneck GJ, Powers CM. Which exercises target the gluteal muscles while minimizing activation of the tensor fascia lata? *J Orthop Sports Phys Ther*. 2013;43(2):54-64.
6. Chou R, Deyo R, Friedly J, Skelly A, Weimer M, Fu R, et al. Nonpharmacologic therapies for low back pain: a systematic review for an American College of Physicians clinical practice guideline. *Ann Intern Med*. 2017;166(7):493-505.
7. Hayden JA, Ellis J, Ogilvie R, Malmivaara A, van Tulder MW. Exercise therapy for chronic low back pain. *Cochrane Database Syst Rev*. 2021;9:CD009790.
8. Sahrmann SA. *Diagnosis and treatment of movement impairment syndromes*. St Louis: Mosby; 2002.
9. Page P, Frank CC, Lardner R. *Assessment and treatment of muscle imbalance: the Janda approach*. Champaign: Human Kinetics; 2010.
10. McGill SM. *Low back disorders: evidence-based prevention and rehabilitation*. 2nd ed. Champaign: Human Kinetics; 2007.