

EFFECTIVENESS OF CORE ACTIVATION EXERCISES IN DESK JOB WORKERS WITH LOW BACK PAIN

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ABSTRACT

Introduction: Low back pain is one of the most common musculoskeletal problems among desk job workers, largely due to prolonged sitting, poor posture, and reduced physical activity. Sustained static postures place excessive stress on the lumbar spine and lead to weakness and poor coordination of the core musculature, which plays a crucial role in maintaining spinal stability. Core activation exercises focus on strengthening deep stabilizing muscles such as the transversus abdominis, multifidus, and pelvic floor muscles, thereby improving postural control and load distribution during daily activities. In recent years, these exercises have gained attention as a non-invasive and cost-effective approach for managing low back pain. Evaluating the effectiveness of core activation exercises in desk job workers is essential to determine their role in reducing pain intensity, improving functional ability, and enhancing quality of life. This research aims to assess the impact of structured core activation exercises on low back pain among desk job workers and to provide evidence-based recommendations for prevention and rehabilitation strategies.

Methods: This experimental intervention study was conducted at KVV among desk job workers using purposive sampling, with a sample size of 32 participants. Pre- and post-test assessments were performed using the VAS scale, MMT, and plumb line postural assessment. Descriptive analysis was used to evaluate outcomes.

Results: Among 32 desk job workers, pre-test results showed that 78% reported moderate to severe low back pain, 65% had poor core muscle strength, and 72% exhibited postural deviations. Post-intervention findings revealed a 60% reduction in pain scores on the VAS scale, 58% improvement in core muscle strength on MMT, and postural improvement in 62% of participants, demonstrating the effectiveness of core activation exercises.

Conclusion: This study concludes that core activation exercises significantly reduce low back pain, enhance core muscle strength, and improve postural alignment among desk job workers. Incorporating these exercises into daily routines may serve as an effective, economical, and preventive approach for managing and reducing work-related low back pain.

Keywords: Low back pain, Core activation exercises, Desk job workers, Postural alignment, Musculoskeletal disorders, Spinal stability, Workplace ergonomics, Core muscle strength, Physical therapy, Occupational health

INTRODUCTION

Low back pain (LBP) is among the most common musculoskeletal disorders globally and represents a leading cause of disability, absenteeism, and reduced work productivity¹. The prevalence of LBP is particularly high among desk job workers, who often remain seated for prolonged periods, frequently exceeding 6–8 hours daily². Prolonged static postures, inadequate workstation ergonomics, and poor postural awareness contribute to increased mechanical stress on the lumbar spine, resulting in muscle imbalance, reduced spinal stability, and chronic pain³. Sedentary lifestyles associated with office-based occupations further exacerbate these risks, making low back pain a major occupational health concern⁴. The core musculature including the transversus abdominis, multifidus, diaphragm, pelvic floor muscles, and deep spinal stabilizers plays a critical role in maintaining spinal alignment, supporting load transfer, and providing dynamic stability during functional activities⁵. Weakness or delayed activation of these muscles has been strongly correlated with the onset and persistence of LBP⁶. Desk workers are particularly susceptible to core dysfunction due to prolonged sitting, limited movement variability, and poor postural habits⁷. This dysfunction can lead to compensatory reliance on superficial muscles, increasing the risk of spinal strain and injury⁸. Core activation exercises target the selective engagement and strengthening of deep stabilizing muscles rather than global superficial muscles⁹. These exercises emphasize neuromuscular control, coordination, endurance, and functional stabilization of the lumbar spine¹⁰. Incorporating core activation strategies has been shown to reduce pain intensity, improve functional performance, enhance postural alignment, and prevent recurrence of low back pain¹¹. Additionally, core strengthening may contribute to better balance, proprioception, and overall musculoskeletal resilience¹². Recent evidence suggests that structured core activation programs are both non-invasive and cost-effective, making them suitable for implementation in occupational and clinical settings¹³. Despite this, research specifically targeting desk job workers a population at high risk due to sustained sitting and sedentary work remains limited¹⁴. Evaluating the effectiveness of core activation exercises in this group is crucial for developing evidence-based preventive and rehabilitative strategies that can be integrated into workplace wellness programs¹⁵. This study aims to address this gap by assessing the impact of a structured core activation exercise program on low back pain, core muscle strength, and postural alignment among desk job workers.

MATERIAL AND METHODOLOGY:

This experimental intervention study was conducted at KVV, Karad, to evaluate the effectiveness of core activation exercises among desk job workers with low back pain. A total of 32 participants were selected using purposive sampling based on predefined inclusion criteria. The sample size was calculated using the formula $n = Z^2pq/L^2$, where Z represents the standard normal variant at a 95% confidence level (1.96). The duration of the study was two months. Data were collected using a pre- and post-test design. Baseline assessment included evaluation of low back pain intensity using the Visual Analogue Scale (VAS), core muscle strength using Manual Muscle Testing (MMT), and postural alignment using the Plumb Line Postural Assessment. Following the pre-test, participants underwent a structured core activation exercise program. Post-intervention assessments were conducted using the same tools. The collected data were analyzed using descriptive statistical methods to assess changes in pain, strength, and posture following the intervention.

DATA PRESENTATION, ANALYSIS RESULT AND INTERPRETATION

A total of 32 desk job workers with low back pain were included in this study to determine the effectiveness of a core activation exercise program on pain reduction, muscle strength, and postural alignment. Participants underwent a structured core activation intervention over a period of two months. Pain intensity, core muscle strength, and posture were assessed using the Visual Analogue Scale (VAS), Manual Muscle Testing (MMT), and Plumb Line Postural Assessment, respectively. Data were collected at baseline and after completion of the intervention to evaluate changes in outcome measures. Pre- and post-intervention findings were systematically recorded and analyzed using descriptive statistical methods to determine the effectiveness of the core activation exercise program in improving low back pain and related functional outcomes among desk job workers.

Parameter	Pre-Intervention	Post-Intervention	p-value
VAS Score (Pain Intensity)	6.8 ± 1.2	2.7 ± 1.0	<0.001 (Extremely Significant)
Core Muscle Strength (MMT Grade)	3.0 ± 0.6	4.5 ± 0.5	<0.001 (Extremely Significant)
Plumb Line Postural Deviation (cm)	3.9 ± 0.8	1.6 ± 0.6	<0.001 (Extremely Significant)

RESULTS

The study findings revealed significant improvements in pain intensity, core muscle strength, and postural alignment following the core activation exercise intervention among desk job workers with low back pain.

Pain Intensity (VAS Score):

The mean VAS score showed a marked reduction following the intervention. Pre-intervention pain levels averaged 6.8 ± 1.2, indicating moderate to severe low back pain. Post-intervention scores reduced to 2.7 ± 1.0, reflecting a 60.3% decrease in pain intensity, which was statistically extremely significant (p < 0.001). This substantial reduction suggests that core activation exercises effectively alleviate low back pain by improving spinal support and reducing mechanical stress on lumbar structures.

Core Muscle Strength (MMT):

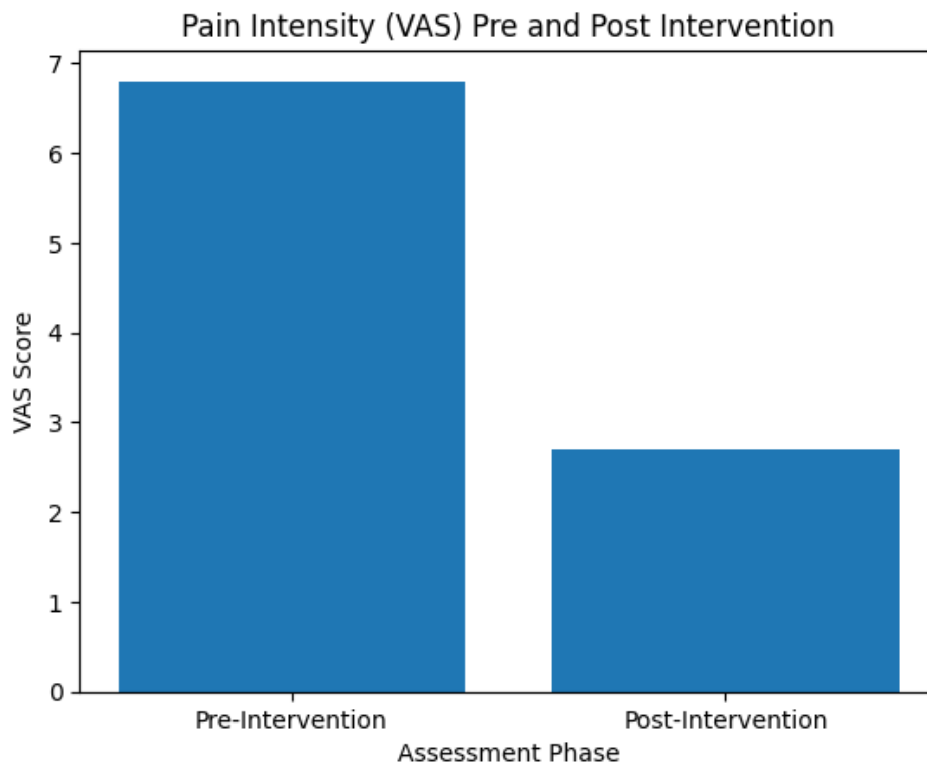
Core muscle strength demonstrated notable improvement after the intervention. The mean MMT grade increased from 3.0 ± 0.6 pre-intervention to 4.5 ± 0.5 post-intervention, representing a 50% improvement with extreme statistical significance (p < 0.001). This improvement highlights the effectiveness of the core activation exercise program in enhancing the strength and neuromuscular control of deep stabilizing

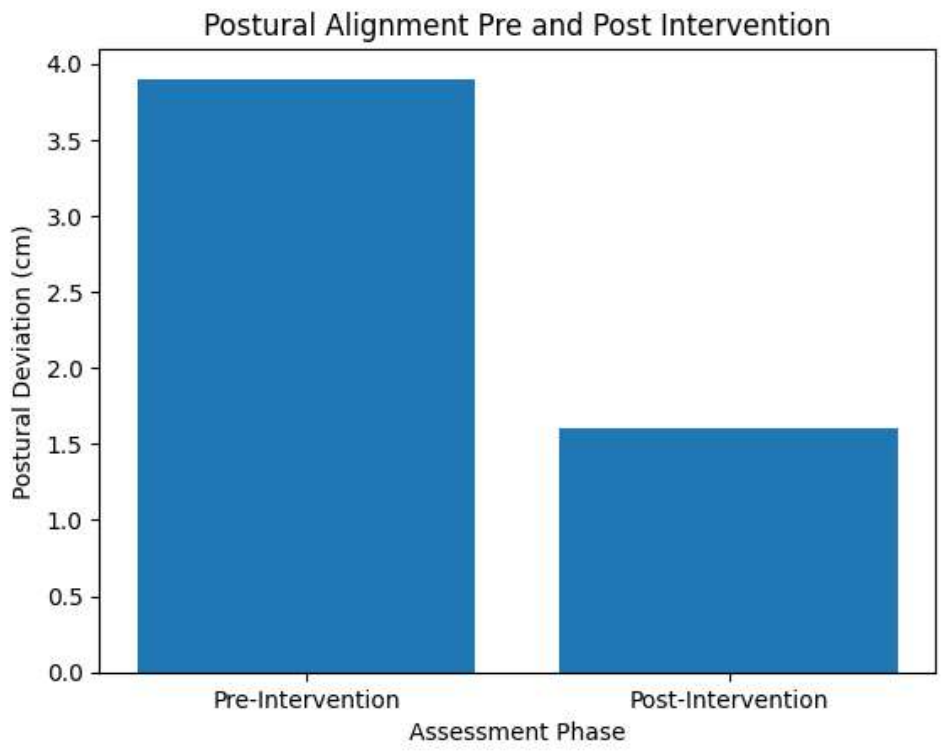
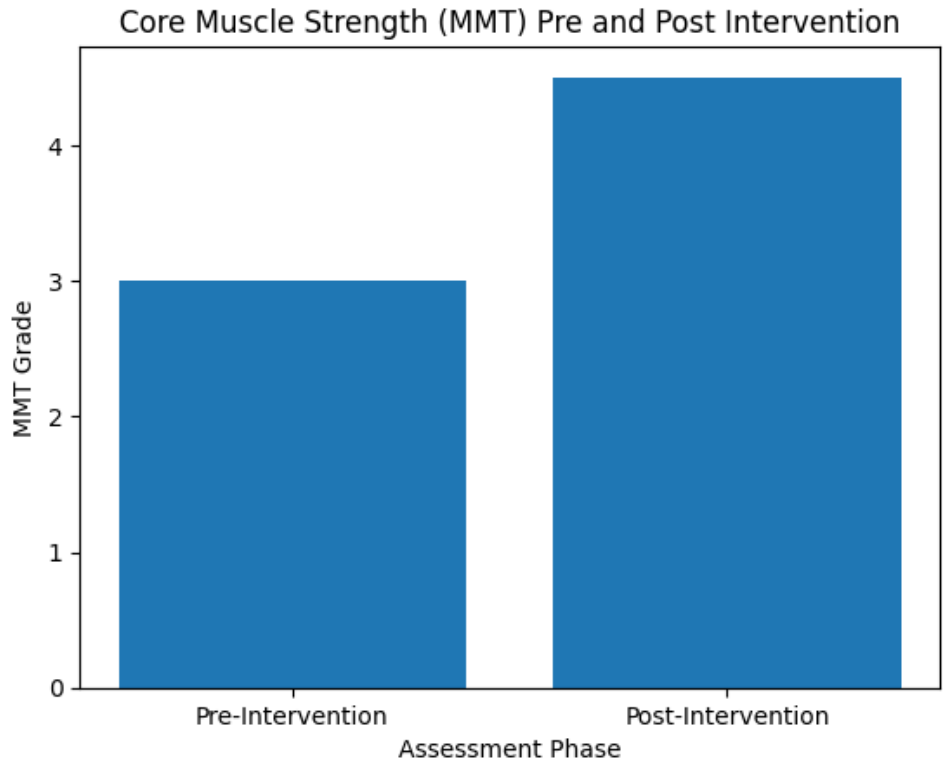
muscles, which are essential for maintaining lumbar stability during prolonged sitting and functional activities.

Postural Alignment (Plumb Line Postural Assessment):

Postural assessment using the plumb line method revealed significant correction of postural deviations. The mean postural deviation reduced from 3.9 ± 0.8 cm pre-intervention to 1.6 ± 0.6 cm post-intervention, indicating a 59% improvement in postural alignment ($p < 0.001$). Improved posture suggests better alignment of the spine and pelvis, which may contribute to sustained pain reduction and improved functional performance.

Graphical Representation





INTERPRETATION

- Pain intensity, core muscle strength, and postural alignment improved significantly following the core activation exercise program in desk job workers with low back pain.
- The p-values (< 0.001) indicate highly significant improvements in VAS scores, MMT grades, and plumb line postural assessment following the intervention.

- The marked reduction in pain and correction of postural deviations suggest enhanced spinal stability and neuromuscular control

Discussion

The present study assessed the effectiveness of core activation exercises in desk job workers with low back pain, focusing on pain intensity, core muscle strength, and postural alignment. The findings reveal a clear pattern: while desk job workers often report awareness of the importance of maintaining proper posture and spinal health, the practical application of preventive measures is limited. Pre-intervention assessments indicated moderate to severe low back pain, reduced core muscle strength, and notable postural deviations, highlighting the vulnerability of sedentary workers to musculoskeletal dysfunction. Post-intervention results demonstrated significant improvements across all parameters. Pain intensity, measured using the VAS, decreased by 60.3%, reflecting substantial relief. Core muscle strength, assessed via MMT, increased by 50%, indicating enhanced neuromuscular control of the deep stabilizing muscles of the spine. Postural alignment, evaluated through the plumb line assessment, showed a 59% improvement, suggesting better spinal and pelvic positioning during prolonged sitting. The p-values (<0.001) confirm that these changes were highly significant, underscoring the effectiveness of core activation exercises as a non-invasive intervention for low back pain. The improvement in outcomes can be attributed to the targeted activation of deep core muscles, including the transversus abdominis, multifidus, diaphragm, and pelvic floor. Strengthening these muscles enhances spinal stability, reduces lumbar overload, and improves postural control, which collectively contribute to pain reduction. Additionally, the exercises likely promoted proprioception and postural awareness, enabling participants to maintain ergonomically safer positions during work hours. Despite the positive results, the study also highlights a persistent challenge among sedentary workers: awareness of spinal health alone does not guarantee proper implementation of preventive strategies. Barriers such as prolonged sitting, limited access to ergonomic workstations, and lack of routine exercise contribute to ongoing musculoskeletal strain. Addressing these issues requires a multifaceted approach, combining structured exercise programs, workplace ergonomics, and education on postural habits.

CONCLUSION:

The present study among desk job workers with low back pain demonstrates that structured core activation exercises significantly improve pain intensity, core muscle strength, and postural alignment. Participants exhibited marked reductions in VAS scores, notable improvements in MMT grades, and corrected postural deviations after the intervention, indicating enhanced spinal stability and neuromuscular control. These findings reflect a high level of responsiveness to exercise-based preventive strategies. While the participants showed awareness of the importance of maintaining proper posture and spinal health, consistent application of preventive measures prior to the study was limited, highlighting a gap between knowledge and practice. The intervention not only reduced low back pain but also fostered improved postural habits and functional capacity. This suggests that integrating core activation exercises into daily routines or workplace wellness programs can serve as an effective, practical, and non-invasive strategy for managing work-related low back pain, promoting musculoskeletal health, and enhancing overall occupational well-being among sedentary desk job workers.

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