

# Effect of Dynamic Sitting Exercise on Mechanical Low Back Pain in Desk Job Workers- A Quasi Experimental Study

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## ABSTRACT

**Background:** Mechanical low back pain (MLBP) is highly prevalent among desk job workers due to prolonged sitting, static postures, and reduced physical activity. Sustained sitting postures lead to muscular fatigue, reduced lumbar mobility, and functional disability. Dynamic sitting exercise has been proposed as a simple workplace-based intervention to counteract these effects.

**Objective:** To evaluate the effect of dynamic sitting exercise on pain intensity, lumbar range of motion, and quality of life in desk job workers with mechanical low back pain.

**Methods:** An experimental pre–post study was conducted on 30 desk job workers aged 18–24 years with mechanical low back pain of more than three months' duration. Participants performed dynamic sitting exercises for four weeks. Outcome measures included the Numerical Rating Scale (NRS), Modified-Modified Schober's Test (MMST), and Oswestry Disability Index (ODI). Data were analyzed using non-parametric Wilcoxon signed-rank test.

**Results:** Statistically significant improvements were observed post-intervention in pain intensity, lumbar flexion and extension, and quality of life ( $p < 0.05$ ).

**Conclusion:** Dynamic sitting exercise is an effective, time-efficient intervention for reducing pain, improving lumbar mobility, and enhancing quality of life among desk job workers with mechanical low back pain.

**Keywords:** Mechanical low back pain, desk job workers, prolonged sitting, dynamic sitting exercise, physiotherapy

## INTRODUCTION

Mechanical low back pain is one of the leading causes of disability worldwide, particularly among individuals engaged in desk-based occupations<sup>1</sup>. Rapid industrialization and technological advancement have resulted in a workforce that spends prolonged hours in seated postures, often with inadequate ergonomic support, predisposing individuals to musculoskeletal disorders<sup>2</sup>.

Mechanical low back pain refers to pain originating from spinal structures without underlying inflammatory, neoplastic, or systemic pathology<sup>3</sup>. This condition is strongly influenced by posture and movement and is commonly aggravated by prolonged sitting<sup>4</sup>. Desk job workers are particularly vulnerable due to sustained static postures, reduced lumbar movement, and insufficient activation of stabilizing musculature<sup>5</sup>.

Prolonged sitting has been shown to reduce lumbar lordosis, increase intradiscal pressure, and impair blood flow to spinal tissues, leading to muscle fatigue and pain<sup>6</sup>. Over time, this contributes to reduced lumbar mobility and functional limitations affecting work efficiency and quality of life<sup>7</sup>.

Dynamic sitting exercise, developed from chair-based decompression principles, combines lumbar extension with abdominal drawing-in maneuver. This exercise aims to offload the lumbar spine, improve muscle activation, and restore spinal mobility during prolonged sitting<sup>8</sup>. It can be easily incorporated into the work routine without additional equipment, making it suitable for desk job workers.

## METHODOLOGY

An experimental pre–post study was conducted in a community setting. 58 desk job workers aged 18–24 years, engaged in computer-based or seated work for more than six hours per day, and experiencing mechanical low back pain for more than three months were recruited using convenience sampling.

Individuals with acute low back pain, diagnosed spinal pathology, inflammatory disorders, congenital spinal deformities, or a history of spinal surgery were excluded.

Baseline assessment included pain intensity using the Numerical Rating Scale, lumbar range of motion using Modified-Modified Schober’s Test, and quality of life using Oswestry Disability Index. Participants were instructed and demonstrated dynamic sitting exercises, consisting of lumbar hyperextension followed by abdominal drawing-in maneuver.

The exercise protocol was performed three times daily, five days per week, for four weeks, with a five-second hold for ten repetitions. Post-intervention assessment was conducted after four weeks using the same outcome measures.



Fig: demonstration of dynamic sitting exercise



Fig: dynamic sitting exercise position

## Statistical Analysis

Data were entered in Microsoft Excel and analyzed using GraphPad Prism software. Normality testing was performed using the Shapiro–Wilk test, which indicated non-normal distribution. Hence, non-parametric Wilcoxon signed-rank test was used. Statistical significance was set at  $p < 0.05$ .

## RESULTS

Sr. no	Outcome measure	Pre test mean	Post test mean	P value
1.	NRS	4.77	1.23	<0.001
2.	MMST Flexion	5.55	5.92	<0.005
	MMST Extension	3.57	4.48	<0.001
3.	ODI	5.55	5.17	<0.013

PRE AND POST DATA

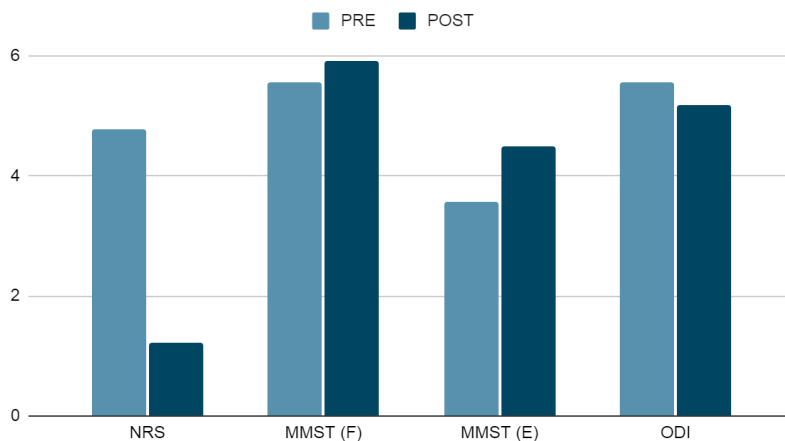


Fig: graphical representation of data

This study included desk job workers from IT companies with 38 males and 20 females aged between 18- 24. The pre data collected had a mean of 5.03 for pain, 5.45 for MMST, and 11.44 for quality of life. After reassessment the mean difference was 3.35 for NRS with post value being 1.68 with a P value of <0.005 indicating 95% intraclass confidence interval, the difference for MMST flexion was 0.91 with a post value of 5.89 p value being <0.005 stating 95% intraclass confidence interval, for extension the mean difference was 0.44 with a post value of 4.48 <0.001 indicating 99% intraclass confidence interval, the mean difference for quality of life was 6.86 p value being <0.013 indicating 87% confidence interval with moderate significance.

## DISCUSSION

The present study evaluated the effectiveness of dynamic sitting exercise in reducing pain, improving lumbar range of motion, and enhancing quality of life among desk job workers with mechanical low back pain. The findings demonstrated statistically significant improvements across all measured outcomes following four weeks of intervention, suggesting that dynamic sitting exercise may serve as a practical therapeutic strategy in occupational settings.

Prolonged sitting is widely recognized as a contributing factor to mechanical low back pain, primarily due to sustained flexed postures, reduced lumbar lordosis, muscular fatigue, and impaired spinal circulation. The observed reduction in pain intensity may be attributed to intermittent spinal unloading and activation of deep

stabilizing musculature through the abdominal drawing-in maneuver incorporated within the dynamic sitting protocol.

Improvements in lumbar mobility, as evidenced by Modified-Modified Schober's Test scores, indicate restoration of spinal flexibility. Enhanced mobility is clinically significant, as restricted lumbar movement is often associated with functional limitations and recurrent episodes of low back pain. The intervention likely promoted better neuromuscular control and circulation, thereby reducing stiffness and improving mechanical efficiency of spinal structures.

The Improvement in Oswestry Disability Index scores reflects meaningful functional gains. Given that desk job workers often experience productivity decline due to persistent discomfort, the integration of dynamic sitting exercises into workplace routines could contribute to both individual well-being and occupational performance. The simplicity and feasibility of the exercise enhance its applicability in real-world settings without additional cost or equipment.

However, interpretation of results should consider methodological limitations. The absence of a control group limits causal inference, and the relatively small sample size reduces generalizability. Furthermore, the short duration of intervention and lack of long-term follow-up prevent assessment of sustained benefits. Future research should employ randomized controlled designs with larger samples and extended follow-up periods. Incorporation of objective ergonomic assessment and muscle activation analysis would further strengthen the evidence base.

Overall, the findings support dynamic sitting exercise as a promising adjunctive intervention for managing mechanical low back pain in sedentary occupational populations.

## CONCLUSION

Dynamic sitting exercise is an effective, low-cost, and easily implementable intervention for managing mechanical low back pain among desk job workers. Regular practice leads to significant reduction in pain, improvement in lumbar mobility, and enhancement of quality of life.

## Limitations

The study lacked a control group, limiting causal inference. The small sample size and short follow-up duration restrict generalizability. Objective ergonomic assessment and muscle activation analysis were not included.

## Future Scope

Future studies should include randomized controlled trials with larger samples and longer follow-up. Ergonomic modifications combined with dynamic sitting exercise should be explored. Comparative studies across different occupational groups are recommended.

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