International Journal of Medical and Allied Health Sciences

ISSN: 2583-1879
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Research Article

EFFECT OF POSTURAL CONTROL EXERCISE AND ERGONOMIC ADVICE IN PATIENT WITH LOWER BACK PAIN AMONG BUS DRIVERS

Rohit shah[1], R. K. Sharma[2], Dr. Soumita Das[3]

1 MOT (Orthopedics) student, Santosh College of Occupational Therapy, Ghaziabad, Uttar Pradesh, India
2 Professor and Dean Paramedical and Principal, Santosh College of Occupational Therapy, Ghaziabad, U. P., India
3 Assistant professor, Santosh college of Occupational therapy, Ghaziabad, Uttar Pradesh, India

Article Information: Received on 09-09-2026, Accepted 26 -09- 2026, Available online 01 -10 -2026

Abstract:

Background: Globally, low back discomfort is a prevalent health issue, resulting physical& psychological deficits, absenteeism, and major socioeconomic expenses. Treatments for persistent low back pain include nonsteroidal anti-inflammatory medications, thermotherapy, electrotherapy, kinesiotaping (KT), therapeutic exercises, occupational therapy, and manual therapy

Methodology: A randomized control trial was conducted on 44 participants aged between 18 to 60 years and split into two groups. The experimental group received traditional occupational therapy treatment in addition to progressive postural control exercises and conventional occupational therapy treatment, participants in the control group also received a home-based program for eight weeks, there were three sessions per week, each lasting forty-five minutes. The effectiveness of the intervention was assessed using the ODI and VAS outcome measure.

R**esults**: Between group analyse using the Mann-Whitney U test showed a statistically substantial difference b/w the group A and group B. For PRE-ODI scores ($p = 0.030$), while the difference in POST-ODI scores approached statistical substantial ($p = 0.052$). No, statistically substantial differences were observed in both groups for PRE-NPRS ($p = 0.216$) and POST-NPRS ($p = 0.074$).

Conclusion: The research concludes that both group interventions were efficient in decreasing pain intensity and functional discomfort, as evidenced by significant improvements in ODI and NPRS scores.

Keywords: Low back pain Bus driver, Ergonomic, ODI, VAS

1. Introduction

Globally, low back discomfort is a prevalent health issue, resulting physical& psychological deficits, absenteeism, and major socioeconomic expenses. Chronic LBP is defined as discomfort in lumbar area lasting more than 12 weeks. In 85% of instances, it is vague, with no discernible underlying condition [1]. Non-specific LBP is a substantial general health problem, affecting productivity, job ability, and quality of life. LBP discomfort that connected with the significant socioeconomic cost [1]. Non-specific LBP has serious worldwide health and socioeconomic consequences, and present treatments are frequently ineffective [2].

*R K Sharma, Professor, Dean Paramedical and Principal Santosh College of Occupational Therapy, Ghaziabad U. P.
E mail: hod.occupationaltherapy@santosh.ac.in,
ORCID ID: 0000-0002-1780-4967
doi: https://doi.org/10.54618/IJMAHS.2026647
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A number of strategies, such as informative programs like back schools, exercise, spine supports like back braces, lifting methods, insoles/arch supports, seat back, movement friendly seating, employee training, management and plaining solutions, have been recommended to prevent low back pain at work. In affluent nations, non-specific low back pain (LBP) has a lifelong predominance of 60–70% and a yearly adult incidence of five percent. 37% of all LBP cases globally are connected to the workplace, with regional variations.

In 2010 Occupational causes contributed to roughly 35% of the worldwide DALYs, with work-related LBP accounting for 21.8 million DALYs. [1,2]., Women are more vulnerable to chronic pain due to hormonal changes such as lower estrogen and estradiol levels during menopause. Treatments for persistent low back pain include nonsteroidal anti-inflammatory medications, thermotherapy, electrotherapy, kinesiotaping (KT), therapeutic exercises,

occupational therapy, and manual therapy. [3]. Chronic LBP is defined as pain that lasts 12 weeks or more [3]. .In 85% of instances, there is no association with radiological abnormalities or biomarkers, hence the condition is classed as chronic non-specific low back pain (CNLBP). Brain-mediated processes such as central sensitization have been linked to pain persistence, and variables such as perceived danger or beliefs that associate pain with harm may lead to fear, avoidance, and disuse.

CLBP is a major contributor to disability, impacting an estimated 619 million people, or around 8% of the world's population. Discogenic pain, or intervertebral disks, is estimated to be the source of around 40% of people with CLBP. In therapeutic practice, however, it is rare to encounter a patient whose chronic low back pain is solely due to one ailment, with no involvement from other conditions. Diagnosing an internally damaged disk as the primary cause of pain is challenging since discogenic lumbar pain presents clinical signs and symptoms that are hard to differentiate from other causes of lumbar mechanical or even radicular pain [4].

LBP is a health condition that is also a leading cause of disability worldwide. It is one of the most prevalent reasons why people seek medical attention, limit their activities, or miss workdays. Disability is most prevalent among working-age populations. LBP is a complicated disorder that manifests pain and impairment in a variety of ways, impacted by biological, psychological, and social variables. Non-specific LBP is characterized by the inability to determine a particular etiology in most patients. Patients diagnosed with lumbosacral radicular syndrome (LRS) exhibit radiating pain ranging from dull, aching, and difficult to localize to acute and burning in the buttock and/or leg, which may be accompanied by one or more additional symptoms suggestive of radiculopathy sensory complaints, muscular weakness, or other problems found during neurological testing. LRS is frequently caused by nerve root irritation/inflammation, while direct pressure from a herniated disk occurs less frequently. LBP is the leading cause of medically certified sick leave and early retirement.

The beginning can be work-related; many people who have been absent from work for an extended period blame it on their job. However, current guidelines for addressing LBP and LRS focus primarily on pain management and rehabilitation of daily functioning in the general population [5].

While the CSE group had an eight-week intervention with CSE, the treatment method was an eight-week PPCE. if the patients failed to finish both the six-month follow-up and the treatment. Participants tried to strengthen using their trunk muscles in case of gravity on a solid surface. There were six exercises in the training regimen. Birddog, bear crawl, glute bridge, crunches, pelvic retroversion, and contralateral arm raising [6].

Bus drivers, among other occupational groups, have been linked to an elevated incidence of LBP. Low back discomfort limit's functional ability and contributes to malingering.

The economic impact includes increased healthcare expenses and lost productivity. The most prevalent physical factors are Factors contributing to driver fatigue include extended sitting, whole-body vibration, and a mismatch between anthropometric size and physical surroundings, including driving methods (automatic or manual) population [7]. The term "eronomic back pain" in the context of GBD refers to the proportion of people who are subjected to work-related circumstances that result in LBP. The population distribution across nine occupational groups serves as the basis for exposure calculations. [7].

The phrase "satisfactory" refers to a bus driver's positive subjective appraisal of the seat's comfort and safety. In comparison, "poor" means the reverse. When evaluating a bus's condition during the last three months, "satisfactory" indicates no serious difficulties, while "poor" indicates a negative review. The three-month term was selected for two reasons:

1) Maintenance schedules: Busses are normally maintained every 3-4 months; therefore, this time provides a picture of the vehicle and seat condition.
2) Busses and seats wear and deteriorate over time. A three-month time may be sufficient to assess a driver's seat condition without deviating from the existing state [8].

Progressive control of posture the consequences of insufficient loading on the health of the spinal tissue have been shown to affect the quality of trunk postural control as a risk factor in development, recurrence, or maintenance of LBP. Although this idea seems reasonable, LBP varies, and the findings of many (small sample) studies are conflicting and unclear.

The ability to maintain both postural balance (managing the center of mass over the base of support) and postural orientation across segments is known as trunk postural control. Motor competence, which comprises the synthesis of coordinated motor output employing a range of muscles and the integration of kinematic (position and movement) data from visual, balacing, and body awareness in space systems, is necessary for trunk postural control. [9].

In India, driver ergonomics are given minimal consideration, and drivers end up utilizing pillows, towels, and other things to offer cushioning and make their journey a bit easier. Ergonomics is concerned with the use of knowledge on human behaviour,

capacities, and Limitations exist in the design of systems, machines, equipment, tasks or jobs, and settings for productive, safe, and successful human usage. The purpose of ergonomics is to guarantee that workers and their jobs are a good fit, therefore increasing Employee comfort, safety and health, productivity, and efficiency. The purpose of this study is to analyse the effect of posture control movement, ergonomic guidance on drivers suffering from lower back discomfort.

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2.0 .MATERIALS and METHODS

2.1 Study design and participants

A randomized controlled trial was reviewed, discussed and approved by Institutional ethical Committee of Santosh College of Occupational Therapy (Ref No. SCOT/JULY-25/ECORTHO-12). 44 individuals with Progressive postural control and ergonomic advice were recruited from the new bus stand &brain clinic autism and rehabilitation center, Ghaziabad. Participants who met the requirements were randomly assigned to two equal groups: an experimental group (n=22) and a control group (n=22). The age range was 18–60 years, and male participants were includedand screened using the ODI and NPRS scale.

Inclusion Criteriawas subject Diagnosis of NSLBP with pain and sign lasting over 3 months, age should be above 18 years to 60 years and no history of spinal disk hernia or accident.Exclusion Criteriawas Chronic lower back pain caused by trauma or structural issues, together with neural sign or pain radiating in the lower limb. earlier surgery, spinal lump and infections, or neural and msd illnesses not related to LBP, such as CVA, PD, demyelination, multiple sclerosis.

2.2 **TREATMENT PROTOCOL**

Group A: PPCE and ergonomics (Experimental Group N=22) + CONVENTIONAL OT TREATMENT

Activities	1st week	2nd week	3rd week	4th week	5th week	6th Week	7th week	8th week
STAGE 1 1. Pelvic backswept 2. Crunches 3. Glute bridge 4. Bird-dog 5. Bear crawl 6. Contralateral arm lifting	5 MIN EACH	5 MIN EACH						
STAGE 2 SAME AS FIRST EXECISE	5MIN EACH	5MIN EACH	5MIN EACH AGAINST GRAVITY	5MIN EACH AGAINST GRAVITY	5MIN EACH AGAINST GRAVITY			
STAGE 3	5MIN EACH	5MIN EACH				5MIN EACH ON UNSTALE SURFACE	5MIN EACH ON UNSTALE SURFACE	5MIN EACH ON UNSTALE SURFACE

Was Receive progressive postural control exercise along with ergonomics of upper extremity 5 minute each for 2 weeks in each stage.

Table- 1: Treatment protocol for experimental groups.

F. **CONTRALATERAL ARM LIFTING**

Conventional OT Treatment for Group A (Sidiq M, et.al 2024)

- Client and family education: about symptoms, energy conservation techniques and fatigue management
- Adaptive equipment's: includes long-handled sponge/brush, sock aids, raised toilet seats, and ergonomic chairs.
- Sleep postures:
  -while lying on back- client should place a pillow under the knees
  -while lying on the side- client should place the pillow between the knees.
- Driving techniques: a small rolled-up towel positioned in the lumbar area, schedule frequent rest breaks to change the position.

- Strategies for stress reduction and coping: deep breathing exercises, meditation and relaxation techniques.

Group B (n=22); Control Group- The subject wasreceiving ergonomic advice for 3 weeks with conventional occupational therapy treatment for 30 minutes, 3days/week for 8weeks. (Cancela JG et al 2025)

Group B: Ergonomic advice 3weeks + CONVENTIONAL OT TREATMENT

1. To decrease lordosis and raise knees when driving, position the seat forward. Sit near the steering wheel.
2. Position the pillow behind your back.
3. Neck stability.
4. Use the rear-view mirror frequently and avoid turning back to examine the vehicle.
5. Keep the knees bent.

2.3 **Outcome measures**

The following standardized outcome measures were used before and after completion of the intervention:

- OSWESTRY LOW BACK PAIN DISABILITYuses pain intensity, and the scale appears to be evaluating a desirable characteristic.
- NUMERIC PAIN RATING SCALE is usedto cause pain intensity.The **NPRS**is a widely utilized tool for assessing pain intensity, where individuals rate their pain on a desirable scale from 0 (no pain) to 10 (worst imaginable pain).
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3 RESULTS

Table 1 Demographic Analysis of both Experimental vs Control Group

The mean age of participants was comparable between both group A (35.82 ± 7.87 years) and the control group (36.82 ± 10.16 years), indicating age homogeneity. All participants in both groups were male (100%), showing complete gender uniformity across groups

Variable	Category	Group A n (%) / Mean ± SD	Group B n (%) / Mean ± SD
Age (years)	Mean ± SD	35.82 ± 7.87	36.82 ± 10.16
Gender	Male	22 (100%)	22 (100%)

Table 2: Baseline Assessment Pre-Data Analysis

Baseline comparison b/w the group A and control groups revealed a significant difference in PRE-ODI scores (t = −2.370, p = 0.022), suggesting that functional disability levels were not entirely equivalent between groups at baseline. Although there is no statistically significant difference were seen in PRE-NPRS scores (t = 1.066, p = 0.292), indicating comparable pain intensity between groups prior to the intervention. Post-intervention comparison demonstrated statistically

Scale	T	P Value	Interpretation
PRE-ODI	−2.370	0.022	Statistically significant difference
PRE-NPRS	1.066	0.292	No significant difference

Table 3: Baseline Assessment Post-Data Analysis

Scale	T	P Value	Interpretation
POST-ODI	−2.135	0.039	Statistically significant difference
POST-NPRS	1.62	0.0113	Statistically significant difference

Table 4: Within Analysis of Both the Group Experimental vs Control Group

Paired Samples Test						
	Paired Differences				t	Significance
			95% Confidence Interval of the Difference			
Pre-Post	Mean	Std. Deviation	Lower	Upper		Two-Sided p
PRE ODI - POST ODI	18.068	8.228	15.567	20.57	14.567	<.001
PRE NPRS - POST NPRS	3.114	0.784	2.875	3.352	26.343	<.001

The effectiveness of the intervention. Paired samples testing revealed a statistically substantial reduction in ODI scores from pre- and post-intervention, in a mean difference of 18.068 ($t = 14.567$, $p < 0.001$), indicating substantial improvement in functional ability following treatment. Similarly, a significant reduction in pain intensity was observed, with NPRS scores showing a mean difference of 3.114 ($t = 26.343$, $p < 0.001$),

4. Discussion

The current study compared the impact of eight weeks Progressive postural control exercise versus eight weeks CSE on CLBP patients. The outcome demonstrate that both interventions reduced CLBP level of pain and impairment in the short term. In addition, Progressive PCE and CSE encourage the contraction of intrinsic back muscles and lumbar correction in individuals with Chronic LBP. In this research, Progressive PCE and CSE had equal effects in terms of pain relaxation and impairment. CSE has also been found to reduce pain severity and function in CLBP patients in the short term. The frequent reductions in VAS, ODI, and RMDQ in the CSE group after the intervention are regular with previous research on core stabilization exercises. The short-term effects last for six months Wang H, .et al 2023.

The current study used ODI and NPRS to assess the intervention's efficacy in terms of pain intensity and functional impairment. Baseline demographic parameters indicated homogeneity among the experimental and control groups in terms of age and gender distribution, suggesting that post-intervention changes could be attributed primarily to the effects of the intervention rather than confounding demographic variables. Such baseline comparability is essential for ensuring internal validity and has been emphasized in prior clinical outcome studies assessing pain and disability.

At baseline, both groups exhibited severe levels of functional disability, as indicated by mean PRE-ODI scores, the control group demonstrating bit higher disability than the experimental group. Although this baseline difference in ODI scores was statistically significant, both groups fell within the same disability classification, supporting clinical comparability. Following the intervention, both groups showed marked reductions in ODI scores, reflecting improvements in functional ability. However, the experimental group demonstrated a greater

magnitude of improvement, with post-intervention scores shifting more prominently toward the moderate disability category. This study indicates that the experimental intervention provided additional benefits in enhancing functional performance beyond conventional management. Similar improvements in functional disability following targeted therapeutic interventions have been reported in earlier studies, highlighting the sensitivity of ODI in detecting clinically meaningful changes (Fairbank & Pynsent, 2000; Fritz & Irrgang, 2001).

Pain intensity outcomes measured using NPRS revealed a comparable trend. At baseline, both groups reported severe pain levels, with no statistically significant difference between them, indicating equivalent pain severity prior to treatment. Post-intervention analysis demonstrated substantial pain reduction in both groups, with NPRS scores decreasing to moderate pain levels. While both interventions were effective in reducing pain, the experimental group showed slightly better post-intervention outcomes. These findings are consistent with existing literature indicating that structured therapeutic interventions can significantly alleviate pain through neuromuscular activation, improved movement patterns, and modulation of pain perception.

Within-group analysis further reinforced the effectiveness of the intervention, as statistically significant reductions were observed in both ODI and NPRS scores from pre- to post-intervention. The large mean differences and highly significant p-values indicate that the intervention produced both statistically and clinically meaningful improvements. Such within-group changes align with previous rehabilitation studies that emphasize the importance of consistent, targeted intervention in reducing pain and disability over time.

Between-group analysis revealed statistically significant post-intervention differences favoring the experimental group for both disability and pain outcomes in parametric testing, although non-parametric comparisons showed results approaching significance. This discrepancy may be attributed to sample size limitations and variability within outcome measures. Nevertheless, the overall trend consistently favored the experimental group, particularly in functional outcomes, suggesting superior effectiveness of the experimental intervention. These findings support acceptance of the alternative hypothesis and showed that the experimental intervention was more effective than the control intervention in reducing pain intensity and functional disability. Collectively, the results of the present study agree with existing evidence supporting the role of specialized therapeutic interventions in improving pain-related outcomes and functional independence.

Hong jiang Wang,et al The Effect of Progressive PPCE on Core Strengthening Exercise in adolescents with severe Back Pain: A Randomized Controlled PPCE showed good short-term benefits on CLBP patients that are comparable to those of CSE. PPCE reduces patient pain and discomfort, increases TrA and MF contractility, and improves postural stability.

Urvej Mansuri1, Shivani Patel Effectiveness of Theragun and Ergonomic Advice in Patients with LBP among Bus Drivers: RCT. In this study, we find that Theragun machine and ergonomic advice provide significant improvement in pain and functional performance in LBP among bus drivers.

CONCLUSION

The research concludes that both group interventions were efficient in decreasing pain intensity and functional discomfort, as evidenced by significant improvements in ODI and NPRS scores. However, the experimental intervention resulted in comparatively greater improvements, particularly in functional outcomes, indicating its superior clinical effectiveness. Baseline homogeneity between groups strengthens the internal validity of the results and supports attribution of observed changes to the intervention itself. Overall, the study supports the effectiveness of the experimental intervention in achieving clinically meaningful reductions in pain and disability, thereby justifying rejection of the null hypothesis and reinforcing its potential role in the management of pain-related functional limitations.

5 DECLARATIONS

- Acknowledgements: The authors acknowledge all those who provided support and constructive input throughout this research.
- Authors' Contributions: RS conceptualized the study, drafted the protocol, carried out data collection, and wrote the initial manuscript draft. RKS supervised the project and critically revised the manuscript. SD edited the manuscript and coordinated submission. All authors read and approved the final manuscript.
- Ethical Approval and Consent: Ethical Clearance no.: SCOT/JULY-25/ECORTHO-12Informed patient consent was obtained from all individual participants included in the study for both intervention participation and publication of data.
- Financial Support Statement: This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.
- Conflict of Interest Statement: The authors declare that they have no competing interests.
- Data Availability Statement: The datasets generated and analyzed during the current study are available from the corresponding author upon reasonable request.
- AI Disclosure: Artificial intelligence tools were not used in the conceptualization, execution, data analysis, or manuscript drafting of this study.

6 REFERENCE

1. Elbasti MS, Akcan K. The Effect of Kinesio Tape Application on Clinical Parameters in Postmenopausal Women With Chronic Low Back Pain: A Randomized Controlled Study. *Cureus.* 2024;16(11):e74088. https://doi.org/10.7759/cureus.74088
2. Sowah D, Boyko R, Antle D, Miller L, Zakhary M, Straube S. Occupational interventions for the prevention of back pain: Overview of systematic reviews. *J Safety Res.*2018;66:39-59..https://doi.org/10.1016/j.jsr.2018.05.007
3. Chen C, Xiao B, He X, Wu J, Li W, Yan M. Prevalence of low back pain in professional drivers: a meta-analysis. *Public Health.*2024;231:23-30. https://doi.org/10.1016/j.puhe.2024.03.007
4. Remer F, Keilani M, Kull P, Crevenna R. Effects of whole-body vibration therapy on pain, functionality, postural stability, and proprioception in patients with subacute and chronic non-specific low back pain: a systematic review. *Wien Med Wochenschr.* 2025;175(1-2):20-40. https://doi.org/10.1007/s10354-023-01026
5. Luites JWH, Kuijer PPFM, Hulshof CTJ, Kok R, Langendam MW, Oosterhuis T, Anema JR, Lapré-Utama VP, Everaert CPJ, Wind H, Smeets RJEM, van Zaanen Y, Hoebink EA, Voogt L, de Hoop W, Boerman DH, Hoving JL. The Dutch Multidisciplinary Occupational Health Guideline to Enhance Work Participation Among Low Back Pain and Lumbosacral Radicular Syndrome Patients. *J OccupRehabil.* 2022;32(3):337-352. https://doi.org/10.1007/s10926-021-09993-4
6. Wang H, Fan Z, Liu X, Zheng J, Zhang S, Zhang S, Yu Q, Lo WL, Chen X, Wang C. Effect of progressive postural control exercise versus core stability exercise in young adults with chronic low back pain: a randomized controlled trial. *Pain Ther.* 2023;12(1):293-308. doi:10.1007/s40122-022-00458-x
7. Yang X, Li B, Wen M, Guo X, Peng H. The impact of population aging on ergonomic-related low back pain across regions with different development levels. *J Pain Res.* 2026.
8. Nabi MH, Hawlader MD, Naz F, Siddiquea SR, Hasan M, Hossian M, Dalal K. Low back pain among professional bus drivers: a cross-sectional study from Bangladesh. *BMC Public Health.*2023;23:1172. https://doi.org/10.1186/s12889-023-16018-7
9. Alshehri MA, Alzahrani H, van den Hoorn W, Klyne DM, Vette AH, Hendershot BD, et al. Trunk postural control during unstable sitting among individuals with and without low back pain: A systematic review with an individual participant data meta-analysis. *PLoS One.* 2024;19(1):e0296968.https://doi.org/10.1371/journal.pone.0296968
10. Jia J, Zhang M, Cao Z, Yang Z, Hu X, Lei S, Zhang Y, Leng W, Kang X. Prevalence of and risk factors for low back pain among professional drivers: a systematic review and meta-analysis. *J OrthopSurg Res.*2024;19:551. https://doi.org/10.1186/s13018-024-04999-z
11. Mansuri U, Patel S. Effectiveness of Theragun and ergonomic advice in patients with low back pain among bus drivers: a randomized controlled trial. *Int J Sci Res.* 2021;10(4):50-53. https://doi.org/10.21275/SR21330095433
12. Cancela JG, Vázquez OC, Ledesma SN, Pruimboom L. The effectiveness of pain neuroscience education in people with chronic non-specific low back pain: an umbrella review with meta-analysis. *Ann Phys Rehabil Med.* 2025;68(8):102020. https://doi.org/10.1016/j.rehab.2025.102020
13. Sidiq M, Muzaffar T, Janakiraman B, Masoodi S, Vasanthi RK, Ramachandran A, et al. Effects of pain education on disability, pain, quality of life, and self-efficacy in chronic low back pain: A randomized controlled trial. *PLoS One.* 2024;19(5):e0294302. https://doi.org/10.1371/journal.pone.0294302
14. Nabi MH, Hawlader MD, Naz F, Siddiquea SR, Hasan M, Hossian M, et al. Low back pain among professional bus drivers: a cross-sectional study from Bangladesh. *BMC Public Health.* 2023;23(1):1172.https://doi.org/10.1186/s12889-023-16018-7