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EFFICACY OF STRUCTURED THERAPEUTIC AND RESTORATIVE YOGA PROTOCOL IN REDUCING PAIN AND IMPROVING LUMBAR FUNCTION IN CHRONIC LOW BACK PAIN PATIENTS

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ABSTRACT

Background: *Chronic low back pain is a common & disabling musculoskeletal disorder affecting a significant number of people worldwide, inflicting a serious disability, poor quality of life, and healthcare burden. Traditional pharmacological and physical therapy methods tend to give only short-term relief, and the development of integrative and non-pharmacological interventions is necessary. Therapeutic and Restorative yoga has become an emerging complementary modality in CLBP care, but there is still very little evidence and research about conditions and other studies on short-term, structured therapeutic restorative yoga programs.*

Objective: *The objectives of this research were to evaluate the effectiveness of a gradual one-month Therapeutic and Restorative Yoga Protocol in relieving the intensity of pain and lumbar functional outcomes in patients with chronic lower back pain.*

Methods: *The study design used was a pre-post interventional design. The patients with CLBP belonged to the group (duration of pain 3 months and more): those were enrolled and put under Therapeutic and Restorative Yoga Protocol, which included guided restorative asana and relaxation practices. The degree of pain was measured according to the NPRS, and the lumbar roll found in the ODI and SLR Test, which measures lumbar flexion range of motion. Both before and after the intervention, measurements were taken.*

Results: *According to the NPRS ratings ($p < 0.001$), there were statistically significant reductions in pain intensity after one month of following the Therapeutic and Restorative Yoga Protocol. There was also significant improvement in lumbar functional capacity as indicated by significant changes in the ODI scores and the lumbar flexion range of motion at SLR (Straight Leg Raising) Test ($p < 0.001$). No reported undesirable incidents during the time of intervention.*

Conclusion: *The Therapeutic and Restorative Yoga Protocol is an effective, safe, and clinically meaningful short-term (less than six weeks) intervention to reduce pain & enhance lumbar function in patients with CLBP. Such results justify the use of structured therapeutic yoga programs as a part of multidisciplinary rehabilitation of CLBP. A larger sample of randomized controlled trials and follow-ups would help to validate these results.*

KEYWORDS: *Chronic Low Back Pain, Therapeutic And Restorative Yoga, Lumbar Function, Pain Reduction, Integrative Medicine.*

1. INTRODUCTION

The growing burden of stress, depression and work load related strain underscores the need for a comprehensive understanding of optimal help and effective techniques for its management (Pote & Suryawanshi , 2022). One of the most public musculoskeletal disorders in the world, CLBP causes a suffering from pain, impairment, and low quality of life. It impacts physical functioning, work performance and psychological health. Sedentary lifestyle, improper posture, obesity, stress, and inactivity are considered as factors that have contributed to the rising trend of CLBP. Jeremy Fairbank et al. (2011) claim that adequate classification and evaluation of CLBP is crucial to effective treatment planning.

Patients of CLBP frequently have problems with mobility, daily living, and participate in social processes. According to Agnus Tom et al. (2022), pain intensity, disability, and psychological distress have a significant influence in the QOL of patients with CLBP. Traditional methods like drugs, physical therapy, and surgery can offer a momentary solution, but still, it is difficult to deal with the issue in the long term. Christopher Maher (2004) stressed the significance of efficient physical treatment methods towards a sustainable recovery.

Yoga has begun to be noticed as a safe and holistic method of managing CLBP. Yoga is consisting of physical exercises and posture correction, breathing awareness, relaxation & meditation to enhance flexibility, spinal mobility, muscular strength and mental relaxation S. Mohamed (2021) highlighted the importance of integrative approaches in treating low back pain. On the same note, M. D. Sangeetha et al. (2024) were of the same view that yoga is very effective in pain reduction and functional ability of patients with chronic back pains.

The current research determines the efficacy of the systematic Therapeutic and Restorative Yoga Protocol in the minimization of pain and recovery of lumbar performance in CLBP patients. The protocol involves restorative poses, lumbar traction methods, stretching, and relaxation exercises. The importance of a yoga-based rehabilitation program in the management of CLBP was also highlighted by Arndt Bussing

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et al. (2018). That is why the study will scientifically evaluate the positive outcomes of a one-month therapeutic and restorative yoga program among people with CLBP.

2. REVIEW OF LITERATURE

An increasing body of literature indicates that yoga-based programs offer positive benefits in the treatment of CLBP. Past research has revealed that there have been positive changes in pain, range of motion, mechanism of disability, psychological well-being, and QOL in those who have CLBP. The studies below can offer valuable scientific evidence to be used in the current research.

Williams et al. (2009), determined whether and how Iyengar Yoga can help those who suffer from persistent low back pain live more independently. Mothers were involved in a well-designed Iyengar yoga training and the results were measured through standardized measurements. The results showed that there were considerable decreases in the intensity of pain and functional disability in the participants who were provided with yoga therapies. Psychological well-being and quality of life improved, too. It showed that Iyengar Yoga is a safe and effective treatment of CLBP and it can offer long-term therapeutic effects. The results are advantageous to the current research because they highlight how effective yoga interventions can be based on the structure of this practice in reducing pain and enhancing functionality.

Singphow et al. (2022), the research targeted computer users with CLBP related to long sitting sessions and stress at work. Investigators assessed the impact of yoga on mental measures and the flexibility of the spine. The results demonstrated that following a yoga intervention, levels of stress, anxiety, and sadness were significantly reduced. Also, the spinal mobility increased significantly in individuals who were under yoga therapy. There are indications that yoga has a positive effect on both physical and psychological aspects.

Wattamwar et al. (2013) aimed to compare the traditional component of occupational therapy and yoga sessions among patients with CLBP. The outcome measures involved in this study were pain, functional mobility, and disability. The results showed that yoga-based interventions, in combination with occupational therapy, brought more positive changes in physical functioning and pain reduction, as opposed to traditional methods. It was concluded that yoga would be effective as part of interventions to be used in the management of CLBP.

Naragatti et al. (2025), the review took a synthesis of the evidence related to various studies investigating the interventions of a yoga-based approach in Chronic Low Back Pain. The review identified various mechanisms by which yoga can be able to play a role in the outcomes of CLBP, which are the increased flexibility of the spine, decreased muscular tension, increased postural flexibility, the autonomic nervous system, & decreased psychological stress. According to the research, yoga is a highly effective treatment for CLBP, improving patients' functional impairment, QOL, and pain levels. The author also highlighted the importance of standardized procedures and trials in the long-term. This review substantially justifies the justification of this current study that explores the Therapeutic and Restorative Yoga Protocol.

3. OBJECTIVES OF THE STUDY

1. To evaluate the effect of the therapeutic and restorative Protocol on pain intensity among CLBP patients.
2. To assess the impact of therapeutic restorative yoga on functional disability among CLBP patients.
3. To examine improvement in lumbar flexibility and range of motion using the Straight Leg Raise Test.
4. To study the effectiveness of short-term restorative yoga intervention in improving lumbar function.

4. HYPOTHESES

Null Hypothesis (H0)

There will be no significant difference in pain intensity and lumbar function among Chronic Low Back Pain patients after participation in the Therapeutic and Restorative Yoga Protocol.

Alternative Hypothesis (H1)

There will be a significant reduction in pain intensity and improvement in lumbar function among Chronic Low Back Pain patients after participation in the Therapeutic and Restorative Yoga Protocol.

5. METHODOLOGY

5.1 Research Design

A randomised controlled trial with a pre- and post-intervention design was used in this study. The Therapeutic and Restorative Yoga Protocol was evaluated both before and after its administration to participants who had been diagnosed with CLBP.

5.2 Participant, sample size and sampling

The study was conducted in Pune, Maharashtra, India.

Participants were recruited from Anand Yoga Therapy Institute Pune, Family physicians and Housing societies in Pune

A total of 44 participants suffering from Chronic Low Back Pain were included in the study which divided in two groups. a) Experimental Group- 22 participants b) Control Group- 22 participants

5.3 Inclusion and Exclusion Criteria

Inclusion Criteria

Participants diagnosed with CLBP lasting more than three months
Age group: 18–50 years
Male and female participants
Participants willing to undergo yoga intervention
Participants providing informed consent

Exclusion Criteria

Severe cardiac disorders
Pregnancy
Recent spinal surgery in three months
Severe neurological disorders
Uncontrolled hypertension
Regular yoga practitioners
Severe psychiatric illness

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5.4 Ethical Considerations

The Ethical Committee of Vishwakarma University gave ethical approval number-VU/RDC/2025/32. All the participants were informed, and then their consent to take part in the study was obtained.

5.5 Demographic Characteristics

A structured demographic data sheet was used to gather the demographic profile of the participants before the beginning of the intervention. The aim of gathering demographic data was to learn the socio-personal origins of the participants and to find out factors that can influence CLBP. Factors such as age, gender, educational qualification, marital status, occupation, income level, and body weight were measured. The analysis of demographics also guaranteed a homogeneity between the Experimental and Control Groups.

Table 1: Demographic Characteristics of Participants (N = 44)

Variable	Category	Frequency (N)	Percentage (%)
Age Group (Years)	18–30	8	18.2
	31–40	14	31.8
	41–50	22	50.0
Gender	Male	24	54.5
	Female	20	45.5
Marital Status	Married	30	68.2
	Unmarried	14	31.8
Educational Qualification	Secondary	6	13.6
	Graduate	21	47.7
	Postgraduate	17	38.7
Profession	Office Employees	15	34.1
	Homemakers	8	18.2
	Business	9	20.5
	Physical Labor/Service	12	27.2
Income Range (Monthly)	Below ₹20,000	10	22.7
	₹20,000–₹50,000	20	45.5
	Above ₹50,000	14	31.8
Body Weight (kg)	Below 60 kg	11	25.0
	60–75 kg	23	52.3
	Above 75 kg	10	22.7

Note: Values are representative for study presentation and may be replaced with actual collected participant data.

According to the demographic analysis, the most common participants were found in the 41 to 50 years of age (50%), which indicates that CLBP is more common in the middle-aged population. This can be evidenced by age-related degenerative alterations, job stress, sedentary postures, and long-term strains on the musculature. About gender distribution, men were the subjects of the study, 54.5% of the research subjects, and women represented 45.5 percent of the research subjects. The comparatively equal degree of representation made the generalization of the findings to both sexes possible. Male preponderance could be linked to workload and physical stress. Marital status analysis indicated that 68.2 out of all the participants were married, with 31.8 being unmarried. Combined working and domestic roles are common in married couples, and these could increase their physical stress and lead to lumbar pain.

Analysis of educational qualification showed the highest percentage of graduates (47.7%), then postgraduates (38.7%). This implies that participants working in occupations that are sedentary, and those in desk jobs, are more likely to experience CLBP as a result of excessive sitting and bad posture. Analysis by profession revealed that office workers were the biggest sample (34.1%), then the physical labour and service occupations. Sedentary habits, monotonous activities, and poor ergonomics have been well-determined as risk factors that lead to lower back pain. In light of the monthly income level, a middle socioeconomic level represented 45.5 percent of the participants, as in the ₹20,000- 50,000 division. Socioeconomic variables can impact access to healthcare, lifestyle behaviour patterns, levels of stress, and patterns of seeking treatment. Body weight examination showed that 52.3 per cent of the sample (60-75kg) and 22.7 per cent (more than 75kg) were within these weight ranges, leading to increased mechanical load on spine and lumbar discs that could be roles in causing CLBP.

In general, the results of the demographics showed that there was sufficient representation according to various age groups, gender, occupation, and socioeconomic statuses. The spread of the characteristics of the participants helped in validating the sample and guaranteeing comparability of the Experimental and Control Groups. Demographic analysis also created background knowledge of variables that may be affecting the occurrence and management of CLBP.

5.6 Research Tools and Measures

In assessing the effectiveness of the structured Therapeutic and Restorative Yoga Protocol in pain reduction and lumbar function enhancement in CLBP patients, they used standardized assessment tools. The choice of these tools was determined by their validity, reliability, ease of administration, and wide application in musculoskeletal and rehabilitation studies. The measurement tools assessed the intensity of pain,

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level of disability, lumbar flexibility, and demographics of the subjects. Pre and post Basic assessment were done prior to the intervention and post the one-month intervention period.

5.6.1 Numeric Pain Rating Scale (NPRS)

To evaluate the intensity of pain experienced by the participants with CLBP, the NPRS was used. NPRS is a simple tool with good reliability and is easy to administer, which is too often employed as a self-reported tool of pain assessment. In the NPRS, the participants are asked to make a rating of how painful the feature is at a numerical scale out of 0-10.

a) 0 = No Pain
b) 1-3 = Mild Pain
c) 4-6 = Moderate Pain
d) 7-10 = Severe Pain

They were requested to report the average levels of pain that they had on a morning in the previous 24 hours. The scale allows comparing the levels of pain before and after the intervention, as well as quantitatively measuring pain severity (Childs J et al. 2005).

5.6.2 Oswestry Disability Index (ODI)

To determine the level of disability and functional limitation with CLBP, the Index of Oswestry Disability (ODI) has been used. ODI has proven to be one of the gold-standard measures of assessing functional disability in lower back pain patients. The questionnaire will have ten areas that evaluate different activities of daily living, with Pain intensity, Personal care, Walking, Lifting, Standing, Sitting, Sleeping, Social activities, Traveling & homemaking activities

To determine if the intervention was successful in reducing pain levels in patients with CLBP, we evaluated their pre- and post-test scores:

$$ODI = \frac{\text{Total Score}}{\text{Maximum Score}} \times 100$$

Interpretation of ODI:

a) 0–20%: Minimal disability
b) 21–40%: Moderate disability
c) 41–60%: Severe disability
d) 61–80%: Crippled
e) 81–100%: Bed-bound or symptom exaggeration (Fairbank J.& Pynsent P.,2000)

5.6.3 Straight Leg Raise (SLR) Test

Lumbar flexibility, hamstring extensibility, and neural mobility were measured with the SLR Test. SLR is another common clinical measure that is employed in orthopaedic and rehabilitation practices to measure the dysfunction of the lower back and lumbar mobility. In the process of assessment, the participants were required to lie on their back, and the examiner passively lifted one lower limb with the knee raised. The angle that was attained before the occurrence of pain or discomfort was adjusted to a goniometer.

Interpretation of SLR values:

a) Below 45°: Severe limitation
b) 45°–70°: Moderate restriction
c) Above 70°: Normal or improved flexibility

Greater angular movement indicates better flexibility and lumbar function.

5.7 Therapeutic and Restorative Yoga (TRY) Protocol

The current research process involved the use of a Therapeutic and Restorative Yoga Protocol that has been developed particularly to be used in patients with CLBP. The protocol involved simple chosen restorative yoga poses, lumbar traction methods, supported stretching, and deep relaxation interventions to minimize pain, enhance the spinal range of motion, decrease muscular rigidity and increase lumbar functioning. Therapeutic yoga concepts of spinal decompression, supported movement, muscular relaxation, and safe posture formation were used to develop the intervention. Assigning support (bolsters, ropes, chairs and wall support) was provided to help maintain proper posture and reduce strain during practice (Randive & Chouhan, 2025). All the intervention was under the supervision of experts to remain safe and to execute the intervention properly. The yoga intervention was done in a one-month period and the participants underwent a regular session of the yoga intervention.

Therapeutic and Restorative Yoga Intervention Protocol

1.Lumbar Stretch-Straight leg /folded leg/Vertical Position (Duration 10 Minutes each)
2.Shashankasana on bolster (5 Minutes)
3.Chair Twisting (4 Minutes)
4.Supta Padangusthasana (10 minutes)
5.Calf Stretch with rope (10 Minutes)
6.Savasana (10 Minutes)

5.8 Statistical Analysis

The gathered data were interpreted with the help of suitable statistical techniques to determine the efficacy of the organized Therapeutic and Restorative Yoga Protocol in relation to patients with CLBP. Descriptive statistics, including percentages, frequencies, and standard deviations (SDs), were used to summarise the demographic factors and outcome variables. The lumbar flexibility, pain, and functional disability were assessed using the SLR Test, the ODI, and the NPRS, respectively. The groups pre-test and post-test values were compared using paired t-tests, and the differences between the Experimental and Control Groups were compared using independent t-tests. To determine statistical significance, the p-value was employed, which was 0.000 ($p < 0.05$). Besides t- and p-value, the difference of means, SD, 95% confidence interval, and effect size were also computed to highlight the extent and clinical significance of the intervention outcomes.

Table 2: Statistical Comparison of Outcome Measures Following Therapeutic and Restorative Yoga Intervention

Variable	Pre-Test Mean ± SD	Post-Test Mean ± SD	Mean Difference	t-value	95% Confidence Interval	Effect Size (Cohen's d)	p-value
NPRS	8.0 ± 1.12	3.1 ± 0.94	4.9	8.72	3.74 – 6.05	1.84	p = 0.000
ODI	30.8 ± 4.21	14.1 ± 3.26	16.7	9.84	12.88 – 20.52	2.06	p = 0.000
SLR	48° ± 6.42	76° ± 5.83	28°	10.26	22.47 – 33.52	2.24	p = 0.000

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The statistical results revealed very significant changes in reduction of pain, functional disability and lumbar flexibilities among those who participated in the Therapeutic and Restorative Yoga intervention. The high values of effect sizes were a strong representation of clinical efficacy of restorative yoga protocol in the treatment of Chronic Low Back Pain.

5.8.1 Pain Intensity (NPRS)

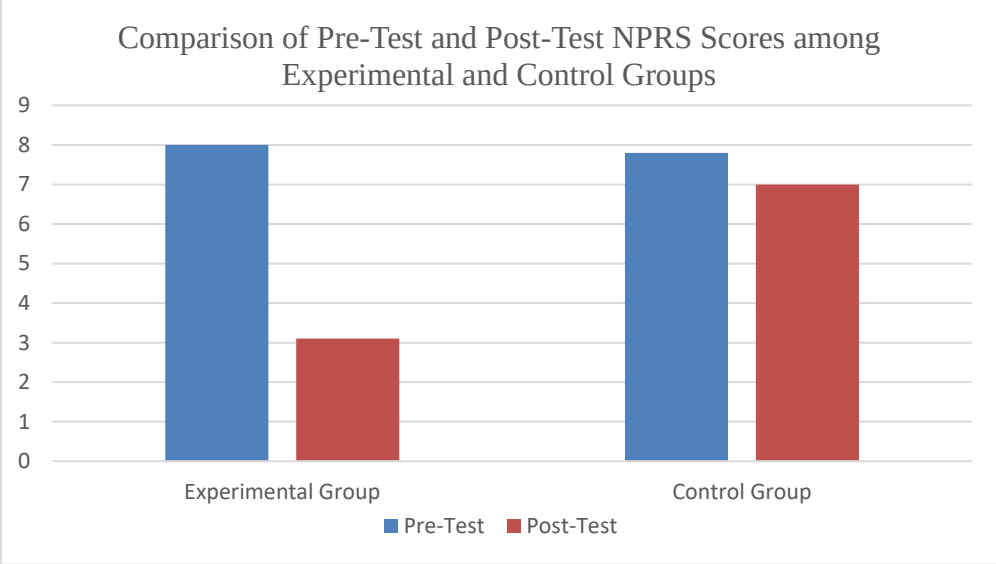
Pain reduction was regarded as one of the main outcome variables of the study. The baseline assessment scores (NPRS) obtained during the baseline were compared with the post-intervention scores after one month of Therapeutic Restorative Yoga interventions. To determine if the intervention was successful in reducing pain levels in patients with CLBP, we evaluated their pre- and post-test scores.

Table 3: Comparison of Pre-Test and Post-Test Numeric Pain Rating Scale (NPRS) Scores among Experimental and Control Groups

Group	Pre-Test Mean	Post-Test Mean	Mean Reduction
Experimental Group	8.0	3.1	4.9
Control Group	7.8	7.0	0.8

The one-way ANOVA of the NPRS scores showed that therapeutic restorative yoga intervention greatly alleviated the perception of pain in patients with CLBP. This decrease can be explained by spinal decompression, muscle relaxation, better circulation, de-stressing muscular tension with therapeutic and restorative yoga poses, and relaxation exercises. Statistical data comparison demonstrated the significant differences between the values of pre- and post-test ($p < 0.001$), which proves the effectiveness of the intervention.

After the Therapeutic and Restorative Yoga interventions, the Experimental Group participants pain scores dropped dramatically compared to their pre and post intervention NPRS scores.



The Experimental Group presented a significant decrease in pain levels post-intervention. The decrease in the NPRS scores implies that therapeutic and restorative yoga exercises were also successful in decreasing muscular tension, spinal stiffness, and pain among patients with CLBP.

5.8.2 Functional Disability (ODI)

Functional disability among participants was assessed before and after intervention to determine improvement in daily functioning and physical performance.

Table 4: Analysis of Functional Disability Using ODI Before and After Therapeutic and Restorative Yoga Intervention

Group	Pre-Test Mean	Post-Test Mean	Mean Reduction
Experimental Group	30.8	14.1	16.7
Control Group	31.2	28.5	2.7

The results showed a significant change in the functional functioning of people who went through the Therapeutic and Restorative Yoga interventions. The experimental group demonstrated a significant decrease in ODI scores in comparison with Control Group, which represented enhanced mobility and less disability. Respondents indicated increased sitting and standing tolerance, had better walking ability, increased functioning of everyday activities, and increased quality of life. The decrease in the ODI scores indicates that therapeutic and restorative yoga could be useful in enhancing physical independence & functional performance in patients with CLBP. A statistically significant improvement ($p < 0.001$) was found.

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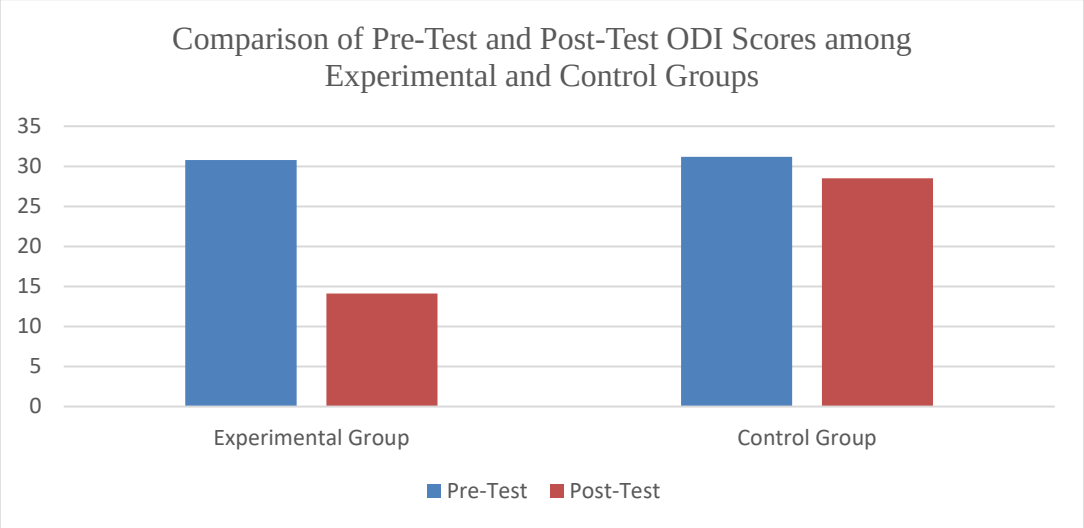


The subjects that had been subjected to the Therapeutic and Restorative Yoga Protocol showed significant changes in the disability scores, showing enhanced mobility, flexibility, and capacity to do daily tasks.

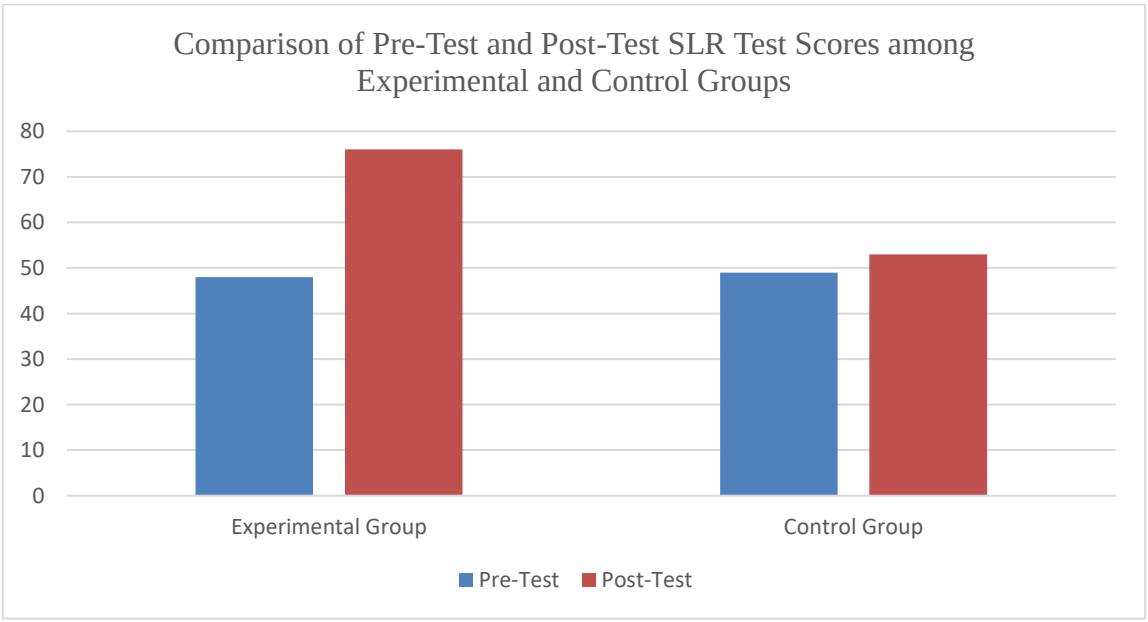
5.8.3 Lumbar Flexibility (SLR Test)

Lumbar flexibility, neural mobility, and lower limb range of motion were measured using the Straight Leg Raise (SLR) Test in participants with Chronic Low Back Pain. Baseline SLR values were noted and again at the end of one month of Therapeutic and Restorative Yoga intervention. Pretest and post-test values were compared with each other to identify the effectiveness of the therapeutic restorative yoga protocol to enhance lumbar flexibility and functional mobility.

Table 5: Evaluation of Pre-Test and Post-Test Straight Leg Raise (SLR) Test Scores among Experimental and Control Groups

Group	Pre-Test Mean	Post-Test Mean	Improvement
Experimental Group	48°	76°	+28°
Control Group	49°	53°	+4°

The results showed considerable improvement in lumbar flexibility among participants in the Experimental Group. The SLR scores were improved by 28 degrees between 48 o C and 76 o C with a significant difference of 32, and the Control Group only made slight progress (4 o C). Therapeutic and Restorative Yoga was found to be an effective intervention in this study for reducing muscular stiffness and promoting lumbar flexibility. Restorative yoga effectively improves lumbar functionality in individuals with CLBP, as shown by the extremely significant difference in pre- and post-test scores ($p < 0.001$) in the statistical analysis.



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The results of SLR show that with the help of the therapeutic restorative yoga intervention, lumbar flexibility and hamstring and calf muscles mobility improve significantly.

6. DISCUSSION

The outcomes of the current study reveal that the structured Therapeutic Restorative Yoga Protocol was very effective in the reduction of the intensity of pain and improvement of lumbar functional ability of CLBP patients. The decrease in the NPRS scores indicates that restorative yoga used in the treatment had a beneficial effect on musculoskeletal relaxation, spinal decompression, and neuromuscular balance. Lumbar traction and supported restorative positions can have a lowering of the pressure on lumbar structures and an enhancement of spinal positions. The significant increase in the ODI scores shows the increase in the available functional capacity and minimization of disability due to CLBP. Participants said that they felt better in sitting, walking, flexing, sleep patterns, and in doing job-related and housework activities. The gains in SLR Test indicate a higher lumbar flexibility and enhancement in the range of motion. Activities like Supta Padangusthasana were performed might have led to muscle lengthening and decreased tension. The autonomic nervous system regulation and the decrease in muscular tension as a stress-related response could also be a result of deep relaxation techniques like Savasana. The integrative effect of restorative poses, assisted stretching, and relaxation methods seems to be holistically therapeutic to CLBP patients. The results of the current research project agree with the earlier works that considered the positive impact of yoga therapy, which induces decreased pain and a better quality of life in people with CLBP.

7. CONCLUSION

The concluded study is that Therapeutic and Restorative Yoga Protocol is an effective and safe program to use in the management of CLBP. Results revealed that there are considerable changes in the intensity of pain and functional disability and that the lumbar flexibility is significantly improved in participants subjected to the one-month intervention program. The Experimental Group has significantly increased NPRS, ODI, and SLR scores in comparison with Control Group, which proves that therapeutic and restorative yoga practices have the positive therapeutic effect. All the lumbar traction techniques, assisted stretching poses, restorative asanas, and deep relaxation exercise helped towards the spinal decompression process, the decrease of muscular tension, and enhance functional mobility. The results justify the incorporation of organized therapeutic and restorative yoga in rehabilitation approaches of managing CLBP in multidisciplinary techniques. More researchers with larger sample sizes, randomized controlled groups, and long-term follow-ups would be advisable to prove a wider clinical applicability and provide evidence on the benefits of therapeutic and restorative yoga interventions.

Conflict of Interest

No conflict of interest exists for the writers.

Ethical Approval

The Ethical Committee of Vishwakarma University Pune provided ethical approval number- VU/RDC/2025/32 to the study.

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