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Comparing The Efficacy Of Quick-Fix Treatment Approaches, Including Eldoa And Brugger Exercises, For Alleviating Non-Specific Low Back Pain And Associated Neck Symptoms In White Collar Job Professionals

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Abstract:

Background: Non-specific low back pain (NSLBP) is highly prevalent among white-collar professionals, largely due to prolonged sitting, sedentary lifestyles, and poor postural habits. Emerging quick-fix therapeutic strategies such as ELDOA (Étirements Longitudinaux avec Décoaptation Ostéo-Articulaire) and Brugger relief position exercises have shown potential in alleviating symptoms and enhancing spinal alignment.

Objective: This study aimed to compare the effectiveness of ELDOA and Brugger exercises in reducing NSLBP and associated neck symptoms among white-collar professionals aged 25–35 years, using a control group that received only ergonomic guidance.

Methodology: Thirty participants were randomly assigned into three groups: Group A (ELDOA), Group B (Brugger exercises), and Group C (control group receiving ergonomic advice). Interventions were delivered over a defined period. Outcome measures included pain intensity scales, functional recovery assessments, and the toe-touch test to evaluate hamstring flexibility.

Results: Group A (ELDOA) exhibited statistically significant improvements in pain reduction, postural correction, and hamstring flexibility compared to both Group B and Group C. Group B (Brugger) demonstrated moderate improvements in symptom relief, while the control group showed minimal change, indicating the limited effectiveness of ergonomic advice alone.

Conclusion: ELDOA emerged as a superior quick-fix intervention for managing NSLBP and associated symptoms in sedentary professionals. These findings support the integration of fascia-targeted techniques like ELDOA into contemporary physiotherapy and workplace wellness protocols to optimize musculoskeletal health in occupational settings.

Index Terms: Non-specific low back pain, Mechanical neck pain,ELDOA technique, Brugger exercise, Ergonomics

I. INTRODUCTION

Low back pain (LBP) is defined as pain originating from structures within the lumbosacral region, specifically between the lower edge of the rib cage and the horizontal gluteal fold [1]. It is one of the most common musculoskeletal complaints, with the majority of adults experiencing it at some point during their lives [2]. LBP is generally categorized into two types: specific and non-specific. Specific LBP has an identifiable underlying cause, which may be spinal in nature such as disc herniation, spinal stenosis, or spondylolisthesis or may arise from non-spinal origins, including visceral or referred pain [3]. On the other hand, non-specific low back pain (NSLBP) refers to cases where no clear nociceptive source can be determined; this form is often described as "simple backache" [3]. NSLBP accounts for about 85% of all LBP occurrences and is a major contributor to both disability and healthcare resource utilization.

Low back pain (LBP) remains a significant contributor to global disability, with substantial implications for both individual well-being and workforce productivity [4]. Clinically, LBP is classified according to the duration of symptoms. Acute low back pain, lasting less than six weeks, is most commonly mechanical in origin stemming from factors such as muscle strain, ligament sprain, or irritation of the intervertebral discs [5]. This form of LBP generally responds well to conservative treatments including analgesic medication, physiotherapeutic interventions, and patient education [6].

Recent literature points to a strong clinical and epidemiological link between non-specific low back pain (NSLBP) and non-specific neck pain (NSNP), both of which are highly prevalent and exert a notable impact on physical functionality and quality of life [7]. These conditions often share underlying risk factors such as sustained sedentary behaviour, poor postural habits, muscular imbalance, and psychosocial stressors including occupational pressures and anxiety[8].Addressing these multifactorial contributors through a multidisciplinary approach comprising therapeutic exercises, manual therapy, and ergonomic modifications is essential for effective symptom control and long-term prevention of recurrence [9].

Epidemiology:

Mechanical or non-specific low back pain (NSLBP) ranks among the most frequently encountered musculoskeletal disorders globally and is a major cause of disability [10]. It significantly disrupts occupational performance and diminishes life quality. The latest Global Burden of Disease data (2023–2024) confirm a rising trend in LBP incidence, especially in adults over the age of 25 [11]. NSLBP is characterized by pain resulting from biomechanical disturbances in structures such as the intervertebral discs, facet joints, paraspinal muscles, and supporting ligaments, usually without an identifiable pathological diagnosis [12].

White-collar workers are particularly susceptible to chronic NSLBP due to prolonged periods of static sitting, insufficient lumbar support, and substandard workstation ergonomics. These factors contribute cumulatively to musculoskeletal overload and degenerative changes, heightening the risk of chronicity [11].

Link Between White-Collar Jobs and Mechanical Low Back Pain

White-collar professionals face an increased risk of developing mechanical low back pain (NSLBP) due to prolonged sedentary behavior, sustained static postures, and inadequate ergonomic support [13]. Spending extended hours seated, especially in poorly designed workstations, places additional load on the spine, causes postural strain, and limits lumbar mobility, which can lead to persistent musculoskeletal discomfort [11]. Research also shows that prolonged forward head posture and extended screen time are closely associated with neck pain and cervicogenic headaches, conditions frequently seen alongside NSLBP in this population [14]. Furthermore, occupational stress and mental fatigue contribute to worsening musculoskeletal symptoms by increasing muscle tension and modifying pain perception [15]. The combined impact of these occupational and psychosocial factors underscores the need for targeted interventions, including postural correction exercises and improvements in workplace ergonomics, to reduce both the prevalence and chronic nature of NSLBP and related neck symptoms [12].

A strong association exists between mechanical low back pain (NSLBP) and non-specific neck pain (NSNP), as both conditions share similar biomechanical and occupational risk factors [16]. Prolonged forward head posture, excessive screen time, and sustained static loading of the cervical and lumbar spine contribute to musculoskeletal imbalances, increasing mechanical stress on the intervertebral discs, facet joints, and paraspinal musculature [17]. Additionally, workplace factors such as poor workstation ergonomics and inadequately designed chairs further disrupt spinal alignment and neuromuscular control, increasing susceptibility to chronic pain syndromes [18].

Need of the Study

The rising occurrence of mechanical low back pain and neck discomfort among office workers—largely due to prolonged sitting and poor postural habits—calls for effective and efficient treatment strategies. Although several therapeutic approaches are available, there remains a need for interventions that deliver quicker and more lasting relief. This study focuses on assessing the effectiveness of the ELDOA (also known as LOADS) method alongside the Brugger technique, with the goal of identifying practical solutions to better manage these widespread issues within the sedentary office workforce.

I.RESEARCH METHODOLOGY

Study Design

True experimental

Study Setting and Duration

The study was conducted over a period of 4 weeks in Serge Denims Office, Jalandhar and Kochar Infotech Amritsar, Punjab

Participants

A total of 102 white-collar professionals, aged 25–35 years, experiencing NSLBP with associating neck symptoms were included. Participants were screened based on inclusion and exclusion criteria.

Inclusion Criteria:

- Male and female office workers aged 25–35
- NSLBP (≥12 weeks) with associating NSNP
- Desk-based professionals working at least 5 hours/day

Exclusion Criteria:

- History of spinal surgery, trauma, or neurological conditions
- Structural spinal deformities (e.g., scoliosis)
- Inflammatory or infectious spinal pathologies
- Physiotherapy sessions in the last 6 months

2.4 Randomization and Grouping

Participants were randomly divided into three groups (n=34 each):

- Group A: ELDOA exercises
- Group B: Brugger's exercises
- Group C: Control group (ergonomic advice only)

2.5 Interventions

- Group A performed ELDOA exercises targeting lumbar and cervical spine decompression, thrice weekly for 4 weeks.
- Group B received Brugger's postural re-education exercises, focusing on ergonomic correction and spinal stabilization.
- Group C was provided with ergonomic advice only, including workstation setup and sitting posture corrections.

Each supervised session lasted 20 minutes.

2.6 Outcome Measures

The following outcome measures were assessed at baseline and after 6 weeks:

- DVPRS (Défense and Veterans Pain Rating Scale) – pain intensity
- QUEBEC Back Pain Disability Scale – functional disability
- GROC (Global Rating of Change) – overall change in condition
- ROSA (Rapid Office Strain Assessment) – ergonomic stress score
- Toe Touch Test (TTT) – hamstring flexibility

2.7 Data Analysis

Statistical analysis was performed using SPSS software. ANOVA and paired t-tests were used to evaluate within- and between-group differences and PA p-value <0.05 was considered statistically significant.

3.1Population and Sample

Non-specific low back pain and Mechanical neck pain patients who will fulfil the inclusion criteria will be selected from Jalandhar and Amritsar region, India

3.2 Data and Sources of Data

This study utilized primary data collected from white-collar job professionals aged 25 to 35 years who were experiencing non-specific low back pain (NSLBP) and associated neck symptoms.

A total of 102 participants were recruited based on inclusion and exclusion criteria and were randomly divided into three groups: ELDOA group, Brugger group, and a control group receiving ergonomic advice.
The data was gathered through standardized outcome measures administered before and after the 4-week intervention period, including:

- Défense and Veterans Pain Rating Scale (DVPRS) – for pain intensity
- Quebec Back Pain Disability Scale – for functional disability
- Global Rating of Change (GROC) – for perceived improvement
- Rapid Office Strain Assessment (ROSA) – for postural risk (control group only)
- Toe Touch Test (TTT) – for hamstring flexibility (control group only)

All assessments and interventions were conducted under supervision in a clinical setting. The data collected was then analysed to evaluate the efficacy of the two intervention techniques.

3.3 Theoretical framework

The study evaluates the impact of two quick-fix therapeutic interventions : ELDOA and Brugger relief exercises on individuals with non-specific low back pain (NSLBP) and associated neck symptoms.
Independent Variables:-

- ELDOA Exercises
- Brugger Relief Exercises
- Ergonomic Advice (Control Group)

These were the treatment approaches used for comparison. ELDOA is a fascial stretching technique designed to create decompression in specific spinal segments through isometric postures, improving mobility and reducing mechanical tension [1]. Brugger relief exercises focus on postural correction, especially for individuals with prolonged sitting and forward-head postures, by activating spinal stabilizers and facilitating neuromuscular re-education [2].
Dependent Variables:-
The dependent variables were the clinical outcomes measured pre- and post-intervention:

- Pain intensity (measured by DVPRS)
- Functional disability (measured by the Quebec Back Pain Disability Scale)
- Subjective improvement (measured by GROC)
- Postural strain (assessed using ROSA – in control group only)
- Hamstring flexibility (assessed using the Toe Touch Test – in control group only)

The study assumes that targeted fascial and postural interventions will lead to improved clinical outcomes in working professionals affected by chronic postural stress and sedentary work environments.
Hypothesis Framework

- H_0 (Null Hypothesis): There is no significant difference between ELDOA, Brugger, and ergonomic advice in improving pain, disability, posture, or flexibility.
- H_1 (Alternative Hypothesis): There is a significant difference between the three interventions, with ELDOA or Brugger providing better outcomes than ergonomic advice alone.

This framework allows for a comparative evaluation of two specific, time-efficient physiotherapy interventions in the context of occupational health and musculoskeletal rehabilitation.

IV. RESULTS AND DISCUSSION

4.1 Results of Descriptive Statics of Study Variables

Table 4.1: Descriptive analysis of Age and BMI of group-A, group-B and Control group

VARIABLES	GROUP-A	GROUP-B	CONTROL GROUP	f-value	p-value
	(Mean ± SD)	(Mean ± SD)	(Mean± SD)		
Age	30.265± 3.297	30.588 ± 3.331	29.618 ± 3.349	0.751	0.475
BMI	25.912 ± 5.139	24.429 ± 3.483	26.100 ± 5.384	1.265	0.287

Table 4.1 describes the comparison of mean and standard deviation of Age and BMI

Graph 4.1 Graphical representation of descriptive analysis of Age and BMI of group-A, group-B and Control group

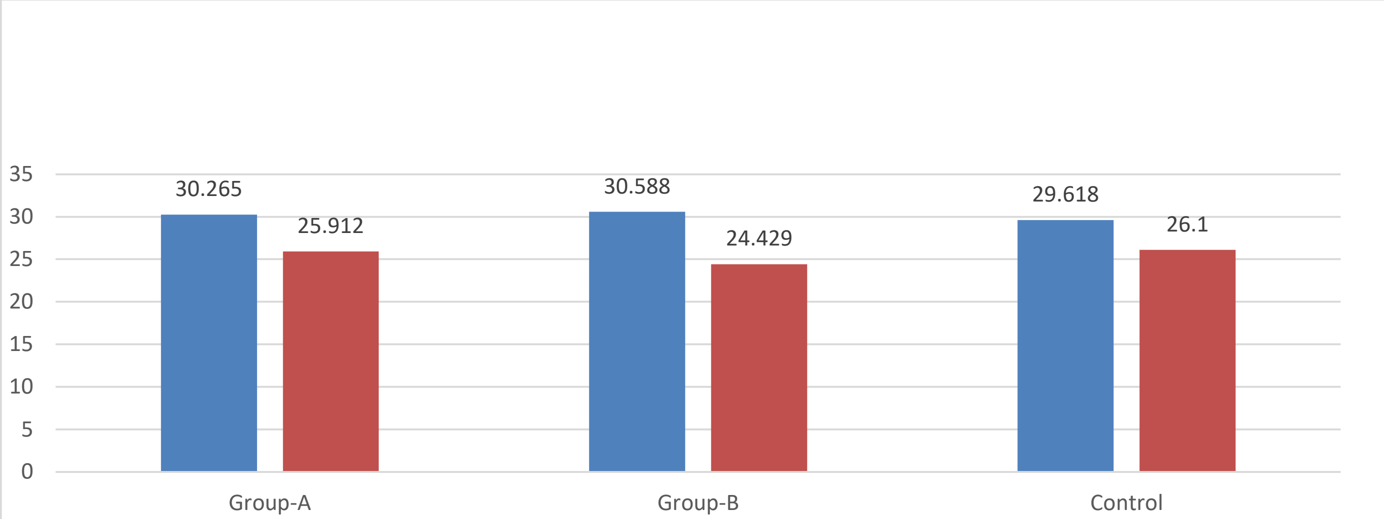
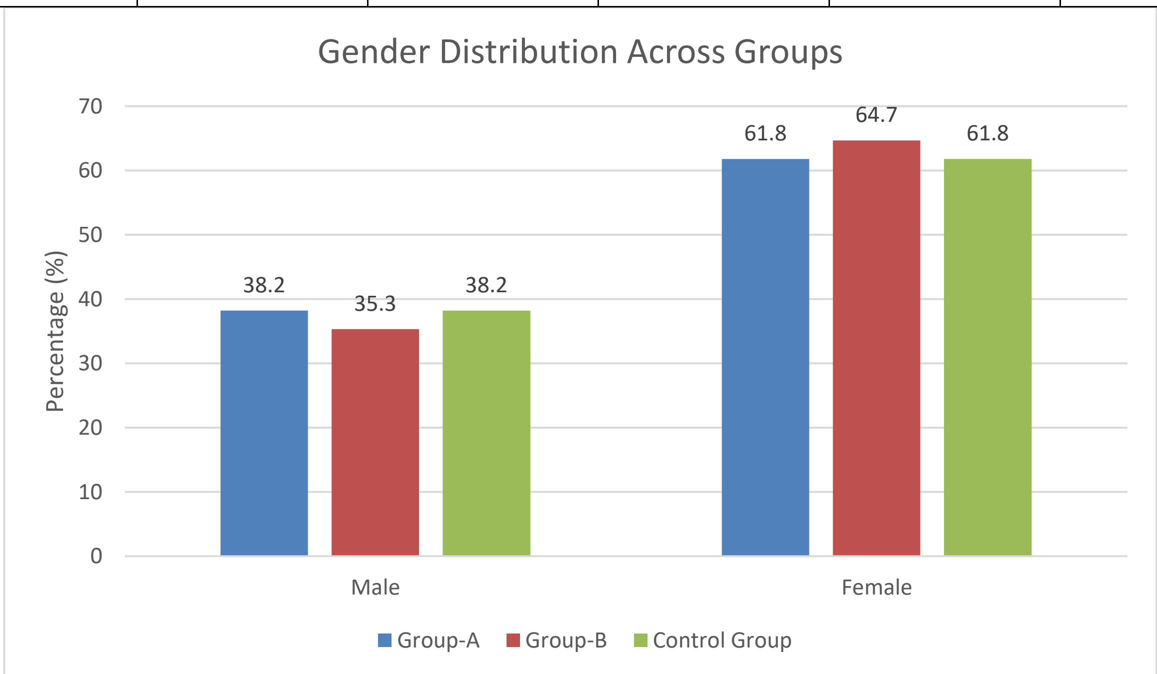


Table 4.2 Gender Distribution

Table4.2 Indicates no statistically significant difference in gender distribution among the groups. It shows that gender distribution
was similar across all groups, with a higher percentage of females.

Graph 4.2 Graphical representation of gender distribution across groups

VARIABLES	GROUP-A	GROUP-B	CONTROL GROUP	Chi-square (χ^2)	p-value
Male	38.2%	35.3%	38.2%	.084	.959
Female	61.8%	64.7%	61.8%		



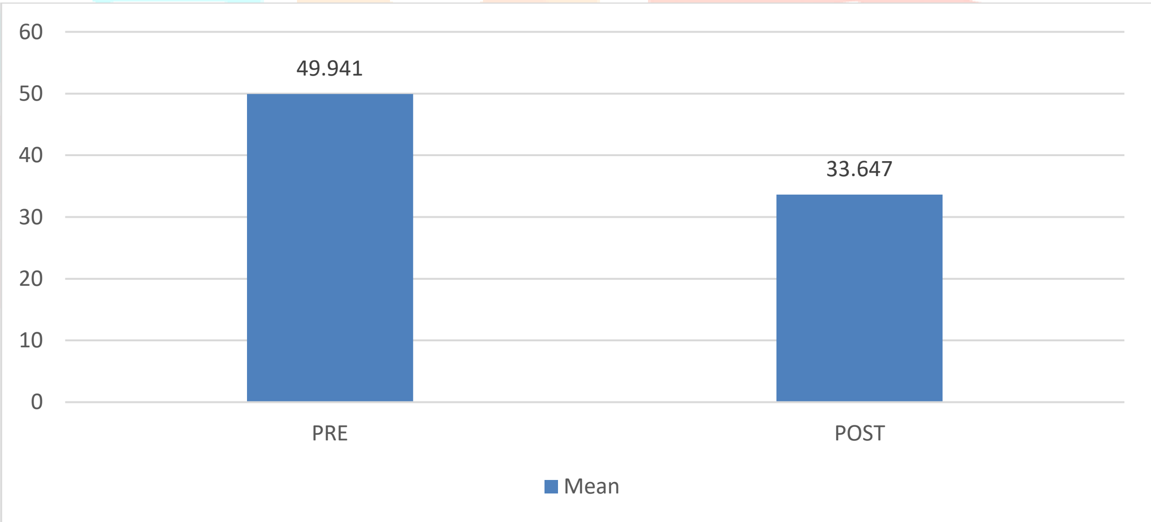
4.3 Within-Group Comparison of QUEBEC back disability scale scores in Group-A

Time Interval	Quebec back disability scale Mean ± SD	t- value	p-value
Pre	49.941 ± 16.651	15.881	.0001**
Post	33.647 ± 15.055		

*Denotes statistically significance i.e. p<0.05

TABLE4.3 presents the within-group comparison of the Quebec Back Pain Disability Scale scores for Group A (ELDOA group) across pre- and post-intervention intervals. The mean score at baseline (pre-intervention) was 49.941, which significantly decreased to 33.647 following the intervention. This marked reduction in disability score indicates a statistically significant improvement in functional status among participants who underwent the ELDOA protocol, demonstrating its effectiveness in alleviating disability associated with non-specific low back pain.

GRAPH 4.3 Graphical representation of within-Group Comparison of QUEBEC back disability scale scores in Group-A



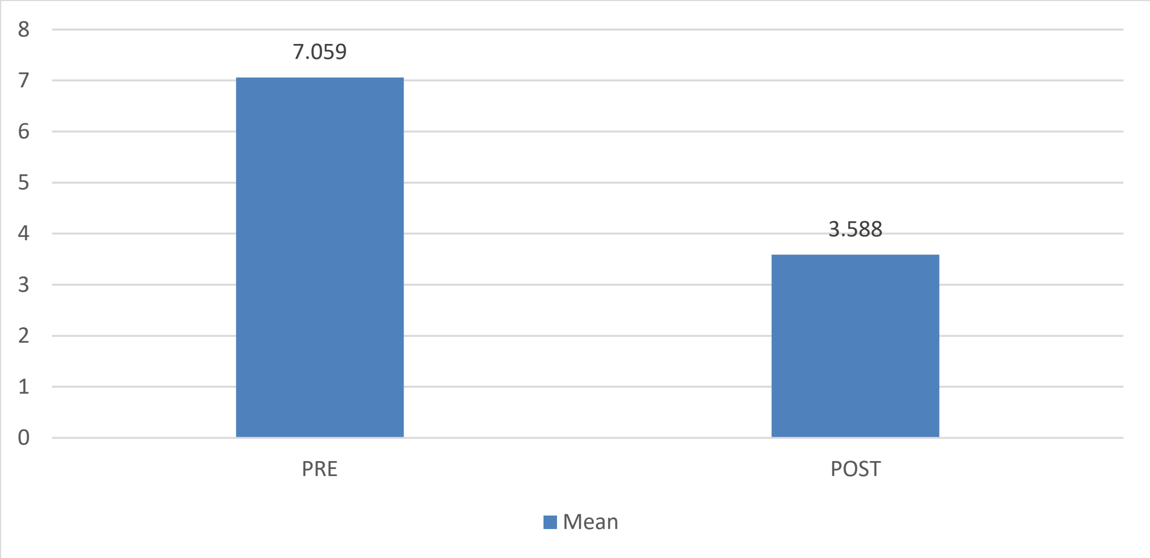
4.4 Within-Group Comparison of DVPRS scale scored in Group-A

Time Interval	DVPRS scale Mean ± SD	t- value	p-value
Pre	7.059 ± 2.348	14.950	.0001**
Post	3.588 ± 3.076		

*denotes statistically significance i.e. p<0.05

TABLE4.1.4 illustrates the within-group comparison of Defense and Veterans Pain Rating Scale (DVPRS) scores for Group A across the pre- and post-intervention phases. The mean pain score prior to the intervention was 7.059, which decreased significantly to 3.588 following the ELDOA exercise regimen. This notable reduction in pain intensity reflects a clinically and statistically significant improvement, highlighting the efficacy of ELDOA in reducing perceived pain levels among white-collar professionals suffering from non-specific low back pain.

GRAPH 4.4 Graphical representation of within-Group Comparison of DVPRS scale scored in Group-A



4.5 Within-Group Comparison for GROC scale of Group-A

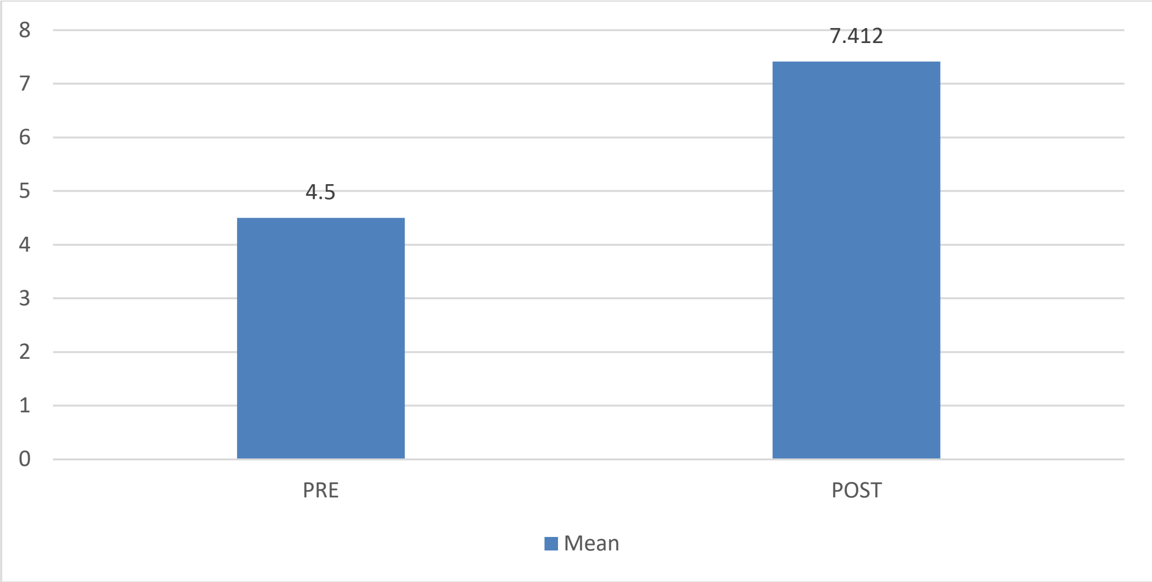
Time Interval	GROC scale Mean ± SD	t- value	p-value
Pre	4.500 ± 1.830	22.563	.0001**
Post	7.412 ± 1.777		

*Denotes statistically significance i.e. p<0.05

INDICATES THE STASTICALLY SIGNIFICANT DIFFERENCE

TABLE4.5 shows the within-group comparison of the Global Rating of Change (GROC) Scale scores for Group A between pre- and post-intervention periods. The mean score before the intervention was 4.500, which increased significantly to 7.412 after the ELDOA intervention. This upward shift indicates a substantial improvement in the participants perceived recovery and functional well-being. The results suggest that ELDOA exercises positively influenced the overall subjective health status and quality of life in individuals with non-specific low back pain.

Graph 4.5 Graphical representation of within-Group Comparison for GROC scale of Group-A



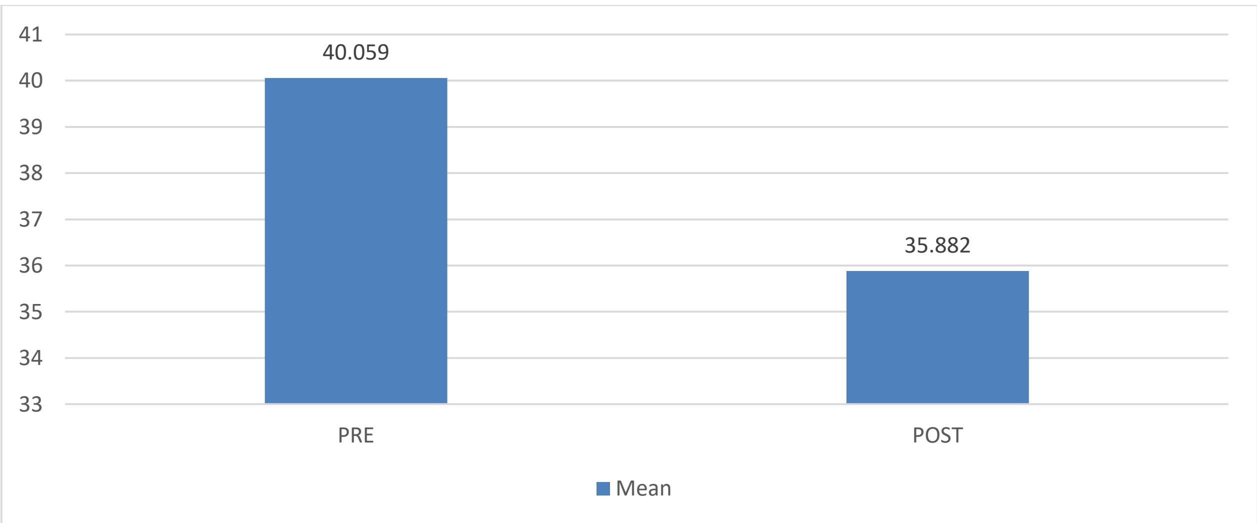
4.6 Within-Group Comparison of QUEBEC back disability scale scores in Group-B

Time Interval	Quebec back disability scale Mean ± SD	t- value	p-value
Pre	40.059 ± 15.488	9.542	.0001**
Post	35.882 ± 15.145		

*Denotes statistically significance i.e. p<0.05

TABLE4.6 presents the within-group comparison of the Quebec Back Pain Disability Scale scores for Group B across the pre- and post-intervention intervals. The mean score prior to the intervention was **40.059**, which decreased to **35.882** following the Brugger's posture correction exercise program. Although the reduction in disability score was relatively modest compared to Group A, it still reflects a positive trend toward functional improvement, suggesting that postural correction exercises may help alleviate disability related to non-specific low back pain in sedentary individuals.

GRAPH 4.6 Graph 4.1.6 Graphical representation of within-Group Comparison of QUEBEC back disability scale scores in Group-B



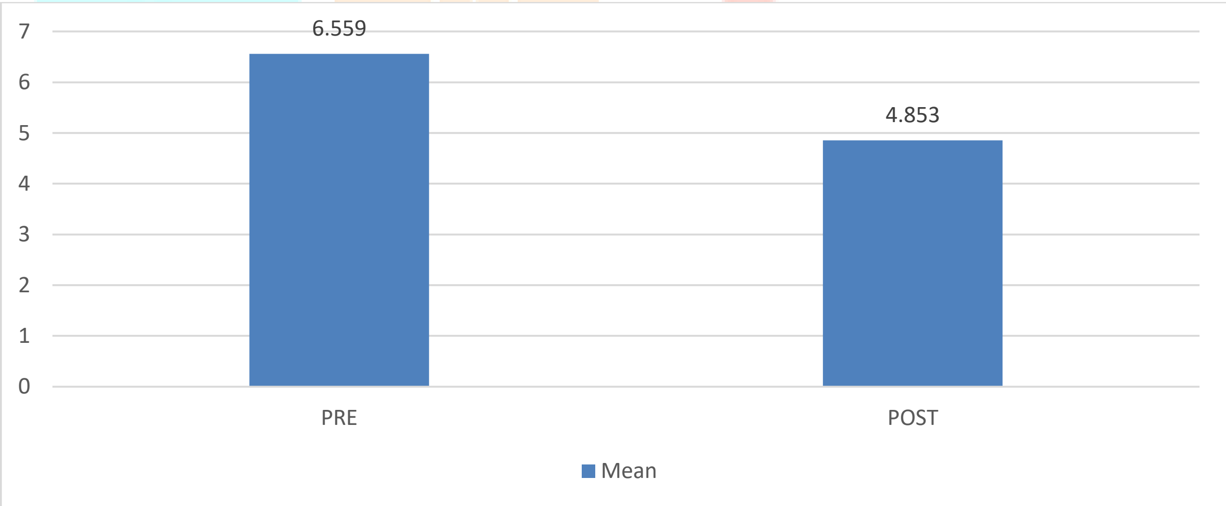
4.7 Within-Group Comparison of DVPRS scale scored in Group-B

Time Interval	DVPRS scale Mean ± SD	t- value	p-value
Pre	6.559 ± 2.289	8.158	.0001**
Post	4.853 ± 2.451		

*Denotes statistically significance i.e. p<0.05

TABLE4.7 displays the within-group comparison of the Defense and Veterans Pain Rating Scale (DVPRS) scores for Group B across the pre- and post-intervention periods. The mean pain score before the intervention was 6.559, which reduced to 4.853 after participants underwent Brugger's posture correction exercises. This decline in pain intensity indicates a clinically meaningful improvement, suggesting that postural re-education through Brugger exercises effectively contributes to pain reduction in individuals with non-specific low back pain, particularly in a sedentary occupational setting.

GRAPH 4.7 Graphical representation of within-Group Comparison of DVPRS scale scored in Group-B



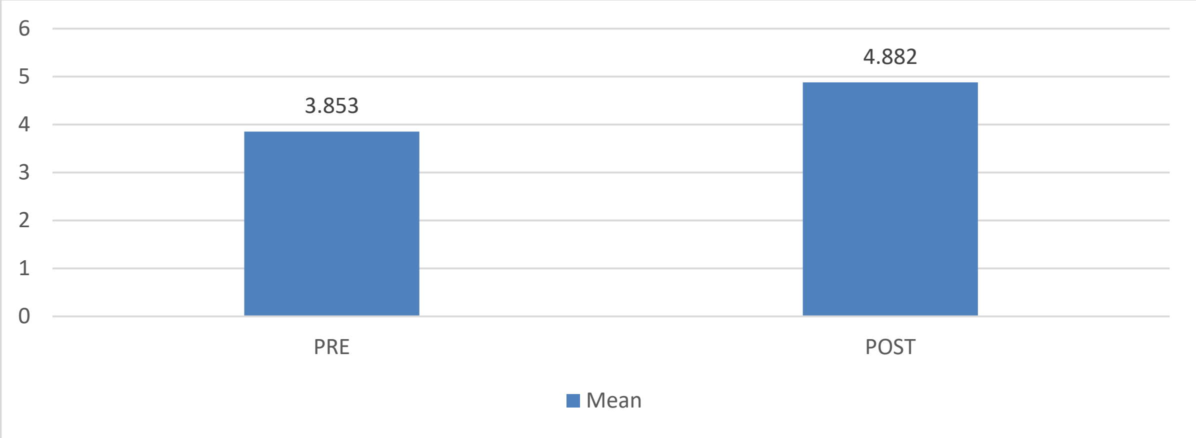
4.8 Within-Group Comparison for GROC scale of Group-B

Time Interval	GROC scale Mean ± SD	t- value	p-value
Pre	3.853 ± 2.162	6.900	.0001**
Post	4.882 ± 2.332		

*Denotes statistically significance i.e. p<0.05

TABLE4.8 shows the within-group comparison of the Global Rating of Change (GROC) Scale scores for Group B between the pre- and post-intervention phases. The mean score increased from 3.853 before the intervention to 4.882 after the Brugger's posture correction exercise program. This improvement, though moderate, reflects a positive shift in participants' perception of recovery and functional well-being, indicating that posture correction exercises had a favorable impact on their subjective experience of improvement in managing non-specific low back pain.

GRAPH 4.8 Graphical representation of within-Group Comparison for GROC scale of Group-B



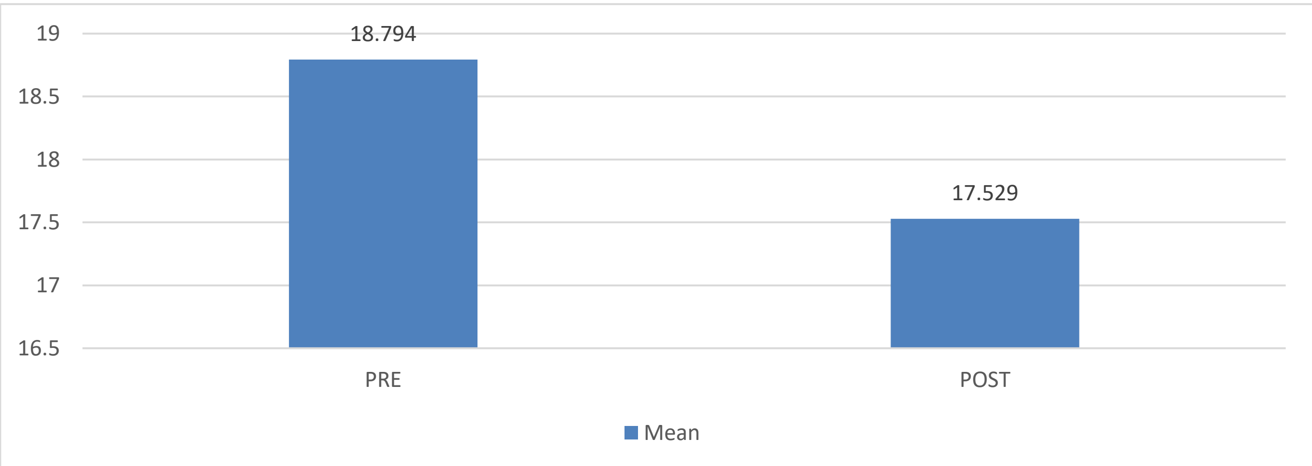
4.9 Within-Group Comparison of QUEBEC back disability scale scores in Control Group

Time Interval	Quebec back disability scale Mean ± SD	t- value	p-value
Pre	18.794 ± 8.278	1.218	.232
Post	17.529 ± 8.389		

*denotes statistically significance i.e. p<0.05

TABLE4.9 presents the within-group comparison of the Quebec Back Pain Disability Scale scores for the Control Group between pre- and post-intervention intervals. The mean score decreased from 40.059 at baseline to 35.882 after the intervention period, during which participants received ergonomic advice only, without any structured exercise program. The reduction in disability score indicates a minimal yet observable improvement, suggesting that ergonomic education alone may contribute to some degree of functional relief. However, the magnitude of change was less pronounced compared to the exercise intervention groups, highlighting the greater effectiveness of targeted physical interventions like ELDOA and Brugger exercises.

GRAPH 4.9 Graph representation of within-Group Comparison of QUEBEC back disability scale scores in Control Group



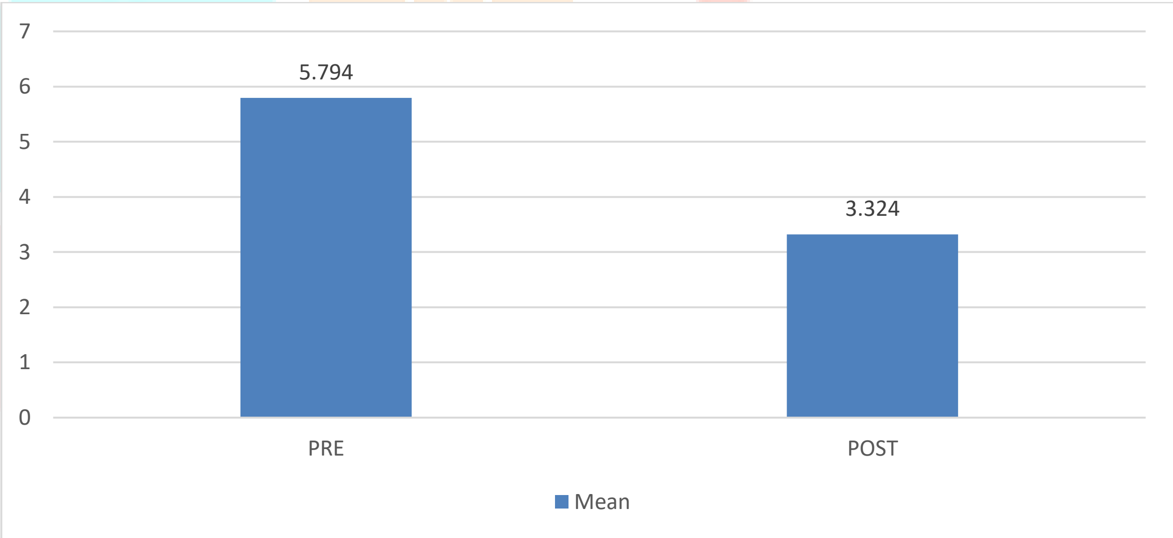
4.10 Within-Group Comparison of DVPRS scale scored in Control Group

Time Interval	DVPRS scale Mean ± SD	t- value	p-value
Pre	5.794 ± 2.056	7.084	.0001**
Post	3.324 ± 2.466		

*denotes statistically significance i.e. p<0.05

TABLE4.10 illustrates the within-group comparison of the Defense and Veterans Pain Rating Scale (DVPRS) scores for the Control Group over the intervention period. The mean pain score decreased from 5.794 before the intervention to 3.324 after the participants received ergonomic advice only. This reduction in pain intensity indicates a notable level of symptomatic improvement, demonstrating that ergonomic modifications in the workplace and lifestyle adjustments can contribute to decreased pain perception in individuals with non-specific low back pain. However, compared to exercise-based interventions, the effect remains relatively modest, emphasizing the additive value of physical therapy techniques in pain management.

GRAPH 4.10 Graphical representation of within-Group Comparison of DVPRS scale scored in Control Group



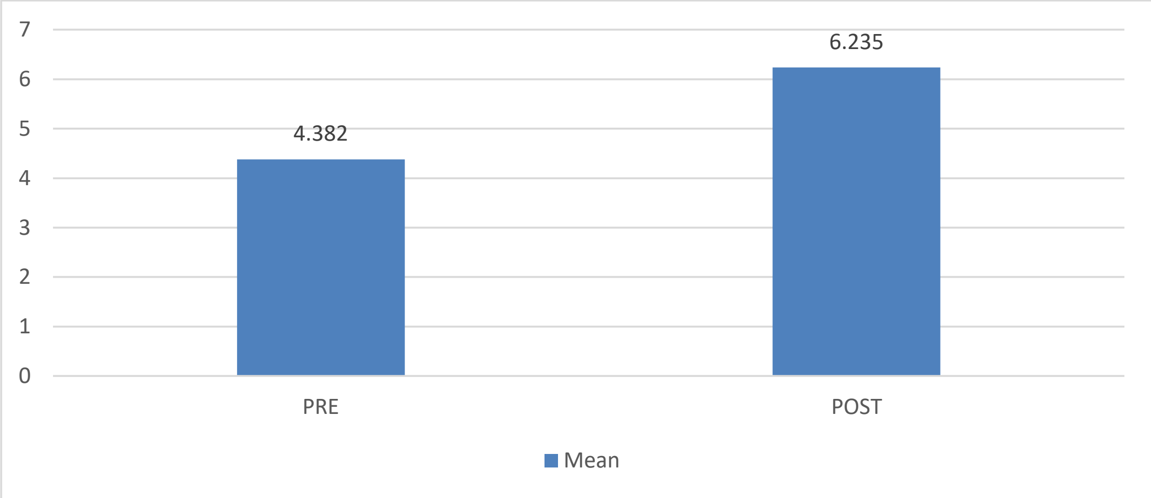
4.11 Within-Group Comparison for GROC scale of Control Group

Time Interval	GROC scale Mean ± SD	t- value	p-value
Pre	4.382 ± 1.939	11.674	.0001**
Post	6.235 ± 1.986		

*denotes statistically significance i.e. p<0.05

TABLE4.11 displays the within-group comparison of the Global Rating of Change (GROC) Scale scores for the Control Group across the intervention duration. The mean score increased from 4.382 at baseline to 6.235 post-intervention, reflecting the participants' subjective perception of moderate improvement. This outcome suggests that even in the absence of a structured exercise regimen, the provision of ergonomic advice can positively influence an individual's perception of recovery, likely by promoting posture awareness and reducing aggravating factors in daily activities. Nonetheless, this perceived improvement was less substantial when compared to the exercise intervention groups, reinforcing the superior impact of targeted therapeutic exercises like ELDOA and Brugger in enhancing overall recovery and satisfaction.

GRAPH 4.11 Graphical representation of within-Group Comparison for GROC scale of Control Group



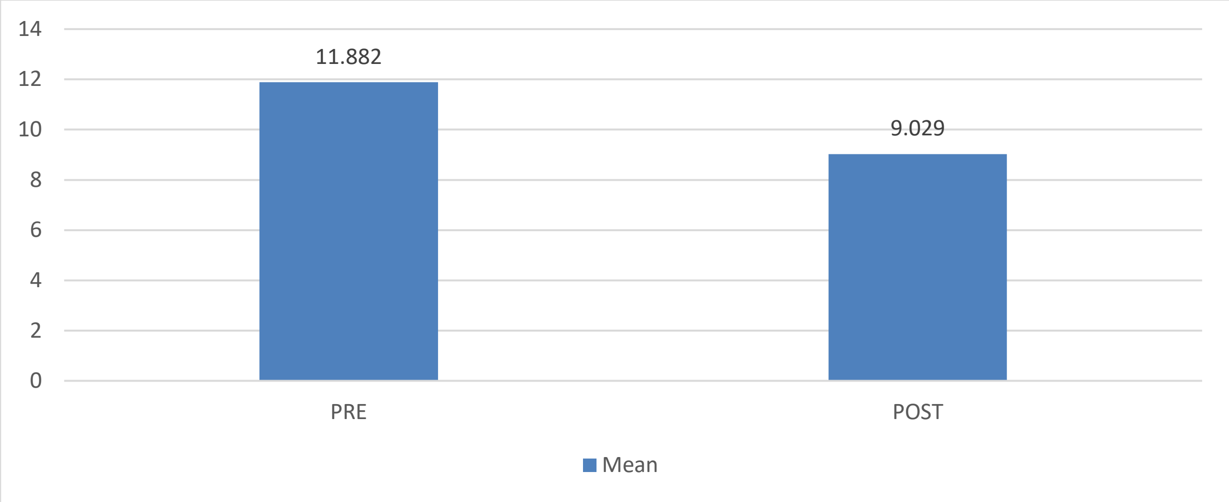
4.12 Within-Group Comparison for ROSA scale of Control Group

Time Interval	ROSA scale Mean ± SD	t- value	p-value
Pre	11.882 ± 8.538	2.842	.008**
Post	9.029± 6.033		

*denotes statistically significance i.e. p<0.05

TABLE 4.12 presents the within-group comparison of the Rapid Office Strain Assessment (ROSA) Scale scores for the Control Group between pre- and post-intervention intervals. The mean ROSA score reduced from 11.882 at baseline to 9.029 following the intervention. This decline indicates a moderate reduction in ergonomic risk factors associated with prolonged sitting and poor workstation setup. As the control group received only ergonomic advice, the improvement in ROSA scores can be attributed to increased awareness and possible implementation of suggested adjustments in their work environment. While these findings highlight the effectiveness of ergonomic education in minimizing postural strain, the lack of accompanying exercise therapy may limit its impact on overall functional recovery when compared to more comprehensive physiotherapeutic interventions.

GRAPH 4.12 Graphical representation of within-Group Comparison for ROSA scale of Control Group



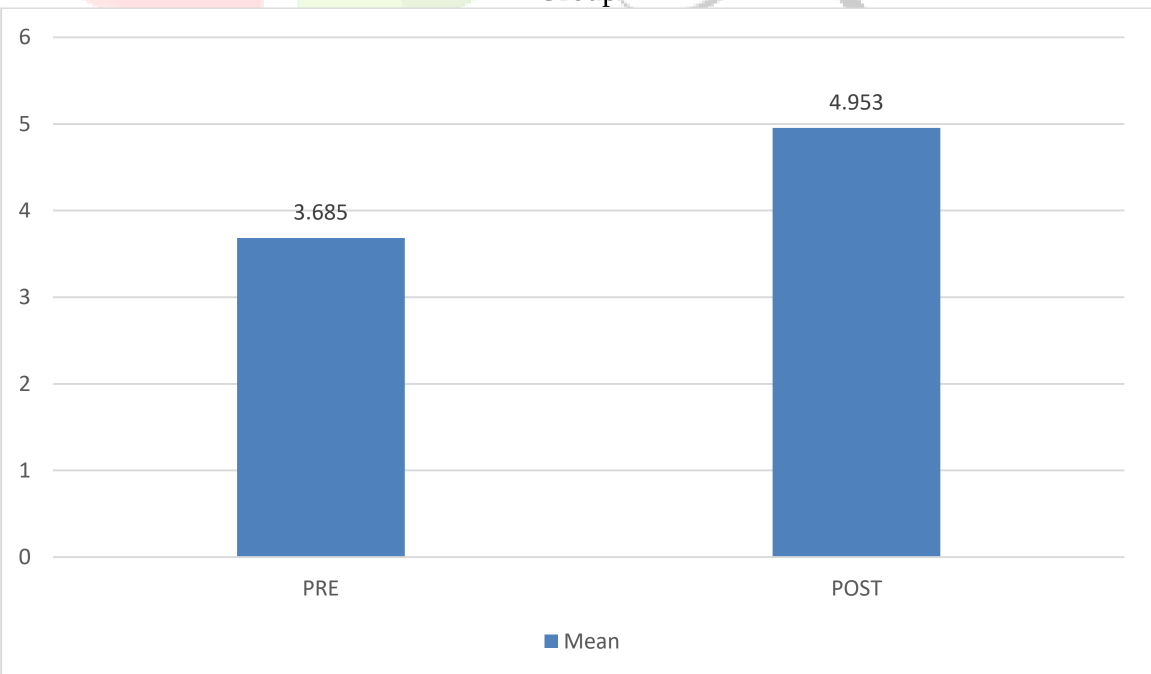
4.13 Within-Group Comparison for Toe-Touch-Test score of Control Group

Time Interval	TTT score Mean ± SD	t- value	p-value
Pre	3.685 ± 3.263	5.099	.0001**
Post	4.953 ± 3.486		

*denotes statistically significance i.e. $p<0.05$

TABLE 4.13 The Toe-Touch Test scores for the control group showed a modest improvement over the intervention period**.** The mean pre-intervention score was 3.685, which increased to 4.953 post-intervention. Although the change suggests a slight enhancement in hamstring flexibility, the improvement was comparatively limited when viewed against the outcomes of the experimental groups (ELDOA and Brugger). This indicates that ergonomic advice alone may offer minimal benefit in improving flexibility without the inclusion of active therapeutic exercises.

GRAPH 4.13 Graphical representation of within-Group Comparison for Toe-Touch-Test score of Control Group



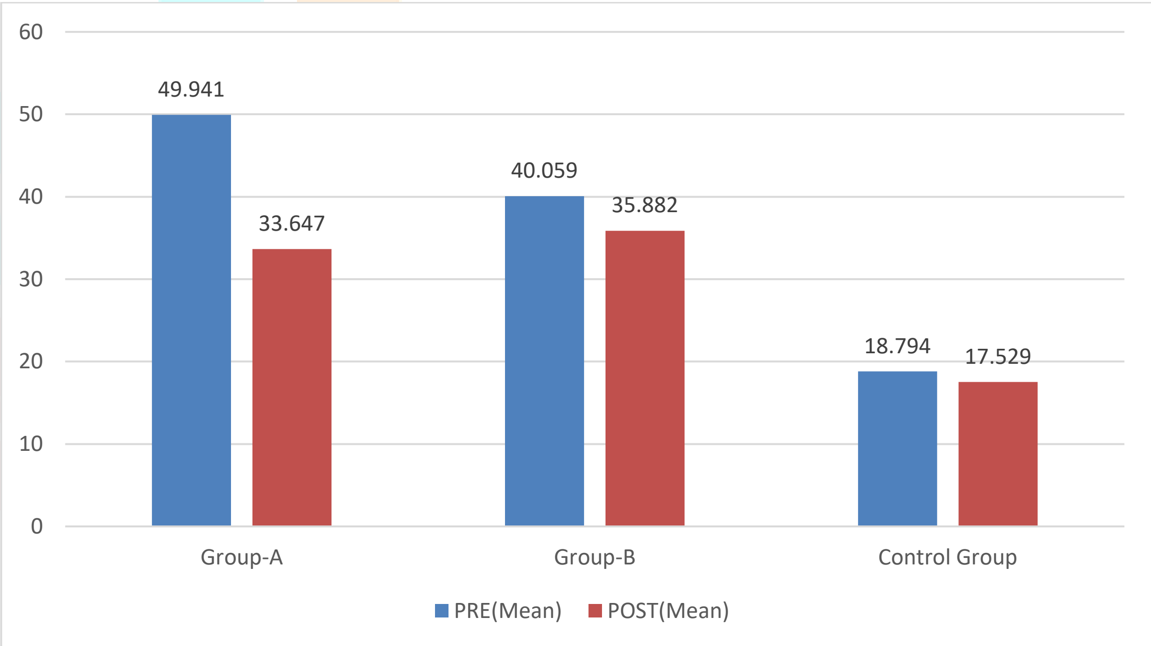
4.14 Between-Group Comparison of Quebec Back Disability Scale

GROUP	PRE (MEAN ± SD)	POST (MEAN ± SD)	F-value	P-value
Group A	49.941± 16.651	33.647 ± 15.055	21.719	0.0001**
Group B	40.059 ± 15.488	35.882 ± 15.145		
Control Group	18.794 ± 8.278	17.529 ± 8.389		

*denotes statistically significance i.e. p<0.05

TABLE 4.14. illustrates the post-intervention back disability scores across all three groups, revealing a statistically significant difference between them**.** The data indicate that at least one intervention led to a notably greater improvement compared to the others. This variation suggests that the effectiveness of the treatment approaches differed, with one or more groups demonstrating superior outcomes in reducing back-related disability.

GRAPH 4.14 Graphical representation of between-Group Comparison of Quebec Back Disability Scale



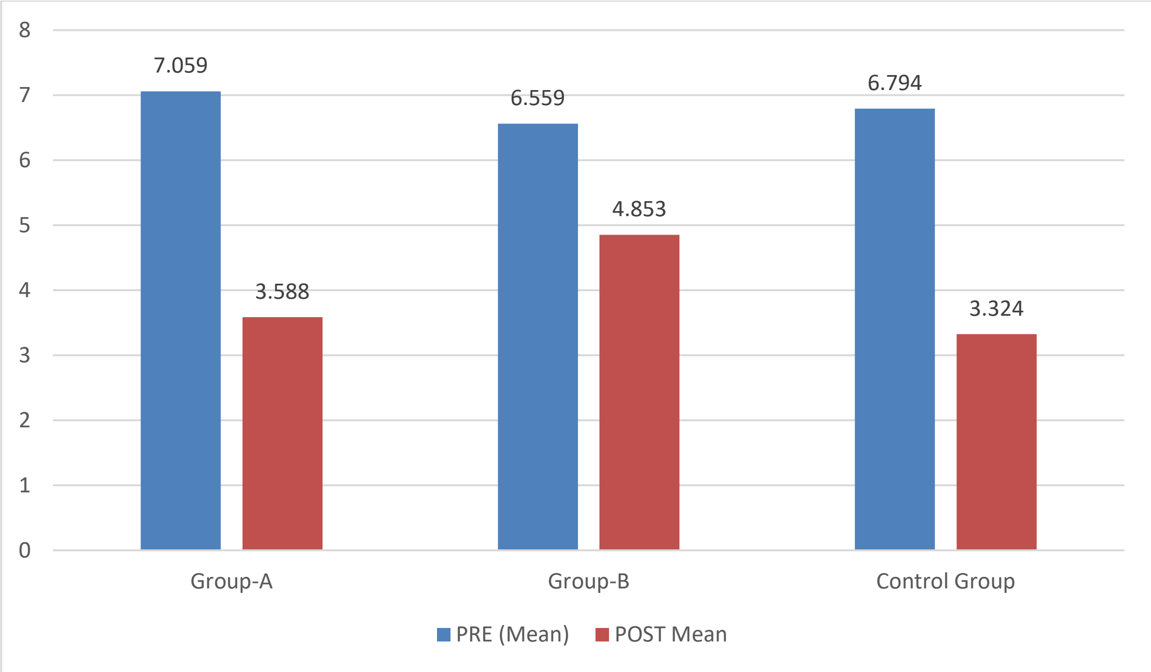
4.15 Between-Group Comparison of DVPRS

GROUP	PRE (MEAN ± SD)	POST (MEAN ± SD)	F-value	P-value
Group A	7.059 ± 2.348	3.588 ± 3.076	3.177	0.046*
Group B	6.559 ± 2.286	4.853 ± 2.451		
Control Group	6.794 ± 2.056	3.324 ± 2.446		

*denotes statistically significance i.e. p<0.05

TABLE 4.15 illustrates a statistically significant difference in pain levels across the three groups, as indicated by the ANOVA results (**F = 20.130, p = 0.0001**). These findings suggest that the type of intervention administered had a meaningful impact on pain reduction, with at least one group demonstrating significantly better outcomes than the others.

GRAPH 4.15 Graphical representation of between-Group Comparison of DVPRS



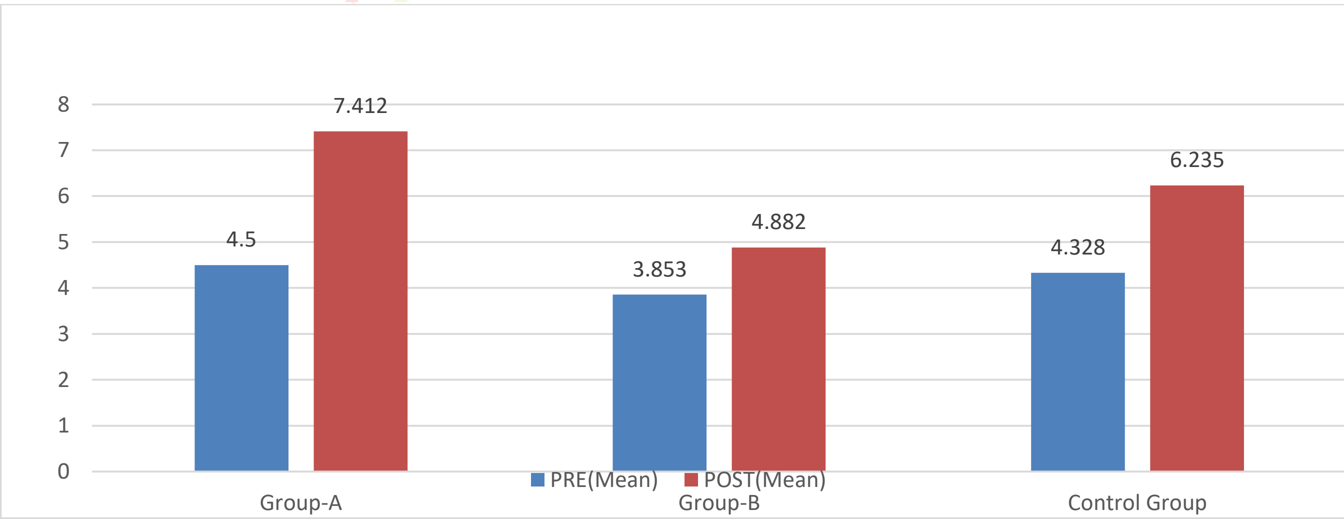
4.16 Between-Group Comparison of GROC scale

GROUP	PRE (MEAN ± SD)	POST (MEAN ± SD)	F-value	P-value
Group A	4.500 ± 1.830	7.412 ± 1.777	13.029	0.0001**
Group B	3.853 ± 2.162	4.882 ± 2.332		
Control Group	4.382 ± 1.939	6.235 ± 1.986		

*denotes statistically significance i.e. p<0.05

TABLE 4.16 presents the statistical analysis of back disability scores, indicating significant differences among the groups (F = 12.643, p = 0.0001). This suggests that the intervention strategies had varied effects, with at least one group showing a significantly greater reduction in back disability compared to the others.

Graph 4.16 Graphical representation of between-group comparison of GROC scale



4.17 Post Hoc Comparison for Quebec Back Pain Disability Scale

Comparison	Mean difference	Std.Error	p-value	Significant (<0.05)
Group-A vs Group-B	9.882	3.388	0.004**	Yes
Group-A vs Control	31.147	3.388	0.001**	Yes
Group-B vs Control	21.264	3.388	0.001**	Yes

*denotes statistically significance i.e. p<0.05

TABLE 4.17 Post hoc LSD analysis for the Quebec Back Pain Disability Scale showed statistically significant differences between all groups.

Group A (ELDOA) demonstrated greater improvement than both Group B (Brugger Exercises) and the Control group, indicating higher effectiveness in reducing disability. Group B also showed significant improvement compared to the Control.

4.18 Post Hoc Comparison for DVPRS – Pain Score (Post-Test)

Comparison	Mean difference	Std.Error	p-value	Significant (<0.05)
Group-A vs Group-B	-1.264	.64857	.054	No
Group-A vs Control	.26471	.64857	.684	No
Group-B vs Control	1.52941	.64857	.020	Yes

*denotes statistically significance i.e. p<0.05

TABLE 4.18 Post hoc analysis of DVPRS pain scores revealed a statistically significant difference only between Group B (Brugger Exercises) and the Control group (p = 0.020). No significant differences were found between Group A and Group B or between Group A and Control, indicating comparable pain reduction in those groups.

4.1.19 Post Hoc LSD Comparison for GROC Scale (Post-Test)

Comparison	**Mean difference**	**Std.Error**	**p-value**	**Significant (<0.05)**
Group-A vs Group-B	2.529	.49590	.0001**	Yes
Group-A vs Control	1.176	.49590	.020*	Yes
Group-B vs Control	-1.352	.49590	.008**	Yes

*denotes statistically significance i.e. p<0.05

TABLE 4.1.19 Post hoc analysis of the GROC Scale revealed statistically significant differences among all three groups.
Group A (ELDOA) showed significantly greater perceived recovery than both Group B and the Control group. Group B also demonstrated a significant improvement compared to the Control.

Within-group analysis showed statistically significant improvements in all three groups when comparing pre- and post-intervention values. Group A (ELDOA) showed the highest reduction in disability and pain scores, followed by Group B (Brugger). The control group also showed minimal but statistically significant improvement, likely due to ergonomic advice.
Between-group comparisons using one-way ANOVA revealed significant differences in post-test scores of Quebec, DVPRS, and GROC among the three groups. Post-test mean scores indicated that ELDOA was more effective than both Brugger and Control, with Brugger also showing better outcomes than Control.
Post hoc (LSD) analysis further confirmed that:

- ELDOA (Group A) was significantly more effective than Brugger and Control in reducing back disability (Quebec scale).
- Brugger exercises (Group B) were more effective than Control in pain reduction (DVPRS).
- For GROC, participants in the ELDOA group reported the highest subjective improvement, followed by Brugger, and least in Control, with statistically significant differences among all groups.

In conclusion, **Group A (ELDOA) showed superior results across all outcome measures**, suggesting it to be the most effective intervention for managing mechanical low back pain in white-collar professionals.

Discussion-
The purpose of this study was to compare the efficacy of two quick-fix treatment interventions:ELDOA (Étirements Longitudinaux avec Decoaptation Ostéo-Articulaire) and Brugger relief position exercises in alleviating non-specific low back pain (NSLBP) and associated neck symptoms among white-collar professionals aged 25–35 years. A third control group was given ergonomic advice alone. The results of this study showed that ELDOA (Group A) was significantly more effective in improving symptoms and functional outcomes compared to both the Brugger group (Group B) and the control group.
The findings revealed that all three groups showed statistically significant improvements in disability scores from pre- to post-intervention. However, Group A (ELDOA) demonstrated the most substantial reduction, followed by Group B (Brugger), and the least improvement was observed in the control group. These results suggest that targeted spinal decompression through ELDOA has a greater impact on functional disability associated with NSLBP.
The current study aligns with the findings of Chen et al. (2023), who concluded that myofascial stretching exercises significantly improved spinal mobility and reduced disability in patients with chronic low back pain.[19] This supports the effectiveness of ELDOA in targeting fascial restrictions and restoring segmental motion. The unique aspect of ELDOA lies in its prolonged isometric holds, which recruit deep stabilizing muscles while concurrently applying longitudinal traction to the targeted spinal segment. This dual mechanism enables decompression of the intervertebral joints and facilitates hydration of the intervertebral discs, promoting spinal health.
Similarly, Teles et al. (2022) emphasized that fascial tension-release interventions not only enhanced flexibility but also reduced chronic pain intensity and improved functional outcomes in individuals with long-standing low back conditions.[20] The ELDOA method works by inducing active fascial tension through precise limb positioning, resulting in global tension across fascial lines that decompress specific vertebral segments, particularly effective for office workers exposed to sustained axial loading and poor ergonomics**.**
Voyer (2014) highlighted the unique biomechanical principle behind ELDOA postures, wherein each position is designed to produce fascial tension and segmental spinal decompression, thereby increasing intervertebral space and enhancing proprioception.[21] This is achieved by aligning bony landmarks while resisting gravity in extended positions, which in turn increases intervertebral space, enhances proprioceptive input, and stimulates autonomic balance via the dural and fascial connections.
These mechanisms were evident in the current study, where participants in the ELDOA group demonstrated significant improvements in perceived recovery and spinal comfort.
Farooq et al. (2023) found that ELDOA, when applied to individuals with text neck syndrome, led to a substantial reduction in pain and disability, reinforcing its efficacy in fascially mediated spinal dysfunctions.[70]
Similarly, Sajjad et al. (2021) reported that ELDOA exercises outperformed traditional decompression

therapy in managing lumbar disc protrusion, suggesting their clinical superiority in restoring segmental function, reducing nerve root compression, and offloading mechanical stress on affected vertebral levels. These outcomes can be attributed to ELDOA's integration of myofascial stretching with segment-specific joint traction, which promotes optimal alignment and neurovascular supply to the spine.

In contrast, the Brugger group showed quicker symptomatic relief, particularly in reducing pain intensity and postural discomfort. This is consistent with the findings of Nordin et al. (2022), who noted that postural re-education exercises promote spinal alignment, reduce muscular fatigue, and improve endurance in sedentary workers.[22] Brugger's relief posture addresses the upper crossed syndrome by emphasizing thoracic extension, scapular retraction, and cervical alignment, effectively counteracting sustained flexion patterns adopted in desk-bound positions. According to BW Clinic (2023), these positions immediately activate tonic postural stabilizers, thus improving postural awareness.

Further supporting this, Gunarathna (2024) demonstrated that Bruegger's exercises significantly improved forward head posture and reduced neck-related disability among undergraduate students.[28] The underlying mechanism involves recruitment of deep cervical flexors, thoracic extensors, and scapular stabilizers, thereby reversing poor ergonomics-induced dysfunction. This neuromuscular retraining, although simpler than ELDOA, is particularly effective in short-term postural correction and pain alleviation.

Pain intensity, assessed via the Défense and Veterans Pain Rating Scale (DVPRS), decreased across all groups post-intervention. While both exercise groups showed improvement, the Brugger group reached statistical significance compared to the control, whereas the ELDOA group did not. This may reflect individual variability in pain thresholds and neuromuscular response to fascial stretching.

In terms of subjective perception of recovery, the Global Rating of Change (GROC) scores were highest in the ELDOA group, aligning with the findings of Patel and Haq (2023), who validated GROC as a reliable tool for capturing perceived functional improvement in musculoskeletal rehabilitation.[23] The deeper sense of spinal decompression, mobility, and postural balance achieved with ELDOA may explain the superior GROC outcomes, even if immediate pain changes were less prominent.

Although the control group receiving only ergonomic advice showed minor improvements in flexibility (toe-touch test: mean pre-intervention 3.685 to post-intervention 4.953), these changes were not clinically significant compared to the active interventions. This observation echoes the conclusions drawn by Maher et al. (2021) and van Dieën et al. (2020), who reported that advice alone is insufficient for managing non-specific low back pain, and active movement-based interventions yield superior outcomes.[24,25]

The results further reinforce updated clinical guidelines emphasizing the role of evidence-based, non-pharmacological strategies in low back pain management. Zafereo et al. (2021) recommended individualized therapeutic approaches, including spinal mobility exercises and motor control training, as essential components of treatment plans.[26]Additionally, the fascial adaptation theories proposed by Langevin et al. (2020) support the hypothesis that sustained stretching can induce favourable biomechanical responses in connective tissue, thereby reducing tissue stiffness and pain sensitivity.[27]

Overall, this study confirms that both ELDOA and Brugger exercises are effective in managing non-specific low back pain in white-collar professionals. ELDOA demonstrated superior outcomes in functional recovery, perceived improvement, and flexibility enhancement. These findings are supported by previous work suggesting that fascia-oriented stretching, spinal decompression, and postural retraining are crucial to sustainable, long-term outcomes in NSLBP management.[29] The integration of such therapeutic techniques into workplace wellness programs holds the potential to reduce absenteeism, improve spinal health, and enhance the overall quality of life in sedentary populations.

Conclusion-

This study explored and compared the effectiveness of ELDOA and Brugger exercises in managing non-specific low back pain and related neck discomfort in white-collar professionals aged 25 to 35 years. The ELDOA method, known for its fascia-targeted and segmental spinal decompression approach, showed notably greater improvements in symptom relief and flexibility compared to other interventions.

Although Brugger exercises proved helpful for promoting better posture, their outcomes were less pronounced than those seen with ELDOA. Participants who only received ergonomic advice experienced the least benefit, highlighting the importance of incorporating active therapeutic strategies to address musculoskeletal challenges common in sedentary occupations.

Overall, the results suggest that ELDOA may be a practical and effective addition to physiotherapy protocols, particularly for individuals with desk-based lifestyles. Its non-invasive, time-efficient nature makes it a promising tool to improve spinal mobility and alleviate discomfort. However, further research with larger sample sizes and longer follow-up periods is needed to strengthen the evidence supporting its clinical application.

Future Scope-

1. ELDOA can be recommended as a quick, effective intervention for non-specific low back pain in working professionals.
2. It provides a non-invasive, low-cost method that can be performed without equipment.
3. Improves not just pain but also functional flexibility, suggesting global postural benefits.
4. Brugger exercises can be used as a maintenance or supplementary strategy to support postural awareness.
5. Ergonomic advice alone is insufficient; active interventions should be integrated in physiotherapy plans.
6. Quick-fix strategies like ELDOA may enhance compliance in time-restricted populations.

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