ISSN: 2347-6567

International Journal of Allied Medical Sciences and Clinical Research (IJAMSCR)

IJAMSCR |Vol. 14 | Issue 4| Oct - Dec 2026

www.ijamscr.com

DOI : https://doi.org/10.61096/ijamscr.v14.iss4.2026.1795-1800

Effectiveness of Egoscue Exercises Versus Three-Dimensional Myofascial Release for Improving Asymptomatic Lumbar Hyperlordosis and Lumbar ROM Among Female College Students: A Comparative Study

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Published on: 21-10-2026
Published by: Futuristic Publications
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Abstract

Background: Lumbar hyperlordosis is a common postural deviation among young adults, particularly female college students, and may lead to altered spinal biomechanics, reduced lumbar mobility, and an increased risk of future low back pain. Conservative physiotherapy interventions such as Three-Dimensional Myofascial Release (3D-MFR) and Egoscue exercises have been used to improve postural alignment, but evidence comparing their effectiveness is limited.

Objective: To compare the effectiveness of 3D-MFR and Egoscue exercises on lumbar lordosis and lumbar range of motion in female college students with asymptomatic lumbar hyperlordosis.

Methods: A comparative study was conducted on 30 female college students aged 17–26 years with asymptomatic lumbar hyperlordosis. Participants were divided into two groups (n = 15 each). Group A received 3D-MFR techniques, while Group B performed an Egoscue exercise program. Both interventions were administered over four weeks. Outcome measures included the Lumbar Lordosis Index (Flexicurve method) and lumbar range of motion assessed using the Modified-Modified Schober's Test for flexion and extension. Statistical analysis was performed using paired and independent t-tests, with the level of significance set at $p < 0.05$.

Results: Both group significant improvements in lumbar lordosis and lumbar range of motion following the intervention ($p < 0.05$). However, the Egoscue exercise group showed significantly greater improvements than the 3D-MFR group in reducing lumbar lordosis and increasing lumbar flexion and extension.

Conclusion: The study conclude that both three-dimensional myofascial release and Egoscue exercises are effective in reducing lumbar lordosis and improving lumbar range of motion. However, Egoscue exercises are more effective in decreasing lumbar lordosis and enhancing flexion and extension

Keywords: Lumbar lordosis, Egoscue exercises, 3D-MFR, lumbar lordosis index, ROM.

INTRODUTION

Lumbar lordosis is a normal inward curvature of the lumbar spine that plays a vital role in maintaining spinal stability, sagittal alignment, postural balance, and efficient load distribution during functional

activities.[3,4] Alteration of this normal curvature results in lumbar hyperlordosis, which is associated with anterior pelvic tilt, muscular imbalance, altered biomechanics, reduced lumbar mobility, and an increased risk of low back pain.[4,9,18]

Core stability, provided by the coordinated activation of the transversus abdominis, multifidus, diaphragm, and other trunk muscles, is essential for maintaining lumbar alignment and preventing postural dysfunction.[6] Weakness of these stabilizing muscles, along with prolonged sedentary lifestyle and poor posture, contributes significantly to the development of lumbar hyperlordosis.[2,5]

Low back pain is one of the most prevalent musculoskeletal disorders, with studies reporting that approximately 90.5% of individuals with low back pain exhibit altered lumbar alignment.[8] Fascial restrictions and impaired myofascial mobility further contribute to postural abnormalities by reducing movement efficiency and disrupting normal biomechanical function.[18,] Therefore, interventions targeting both muscular imbalance and fascial restriction are essential for effective postural correction.

Egoscue exercises are designed to restore postural alignment by correcting muscle imbalance and improving movement patterns, while Three-Dimensional Myofascial Release (3D-MFR) improves fascial mobility through sustained multidirectional manual techniques.[12,15,16,] *Although* both interventions have demonstrated effectiveness individually in reducing lumbar hyperlordosis, evidence regarding their combined effect remains limited. Therefore, the present study aims to evaluate the effectiveness of Three-Dimensional Myofascial Release combined with Egoscue exercises in improving lumbar posture and functional outcomes in individuals with lumbar hyperlordosis.

METHODS

Study Design and Setting: A comparative study was conducted over a period of eight months. Ethical approval was obtained from the Institutional Ethics Committee (Approval No.: RIPR/DT/21/4525). Written informed consent was obtained from all participants before enrolment in the study.

Participants: A total of 30 female college students were recruited using purposive sampling. The participants were aged 17–26 years and were selected based on the predefined inclusion and exclusion criteria. Eligible participants were randomly allocated into two groups, with 15 participants in each group. Group A received three-dimensional myofascial release (3D-MFR), while Group B received an Egoscue exercise program.

Inclusion Criteria: Participants were included if they met all of the following criteria: Female college students aged 17–26 years, Lumbar lordosis angle greater than 40°, Asymptomatic lumbar lordosis, Lumbar flexion less than 6 cm and lumbar extension less than 2 cm, as assessed using the Modified-Modified Schober's Test and no current spinal-related physical complaints.

Exclusion Criteria: Participants were excluded if they had any of the following: History of spinal surgery or spinal fracture, Postpartum status, Diagnosed lumbar radiculopathy, lumbar spondylosis, ankylosing spondylitis, or prolapsed intervertebral disc, Localized or radiating low back pain, History of treatment for low back pain within the previous six months and Participation in a structured exercise program or regular sports activity within the previous six months.

INTERVENTIONS

Participants were assigned equally into two groups (n = 15 each).

Group A: Three-Dimensional Myofascial Release

The three-dimensional myofascial release (3D-MFR) intervention consisted of the following techniques: Three-dimensional stretch, Three-dimensional stretch with trunk rotation and Three-dimensional stretch with head tilt

The 3D-MFR intervention consisted of three sets of release, with each set held for 90 seconds. Each treatment session lasted approximately 30 minutes and was performed on alternate days for a period of 4 weeks.

Group B: Egoscue Exercise Program

The Egoscue exercise program consisted of the following exercises: Static back and static back with breathing, Abdominal contraction while in the static back position, Abductor press, Overhead extension, Elbow curls on the wall, Static wall, Spinal twist, Pelvic tilts, Supine groin, Supine groin progression and Air bench

The exercises were performed progressively over a period of 4 weeks. During the first week, each exercise was performed for 3 repetitions with a 30-second hold and 5 seconds of relaxation. During the second week, the exercises were performed for 5 repetitions with a 30-second hold and 5 seconds of relaxation. During the third week, the exercises were performed for 10 repetitions with a 30-second hold and 5 seconds of relaxation. During the fourth week, the exercises were performed for 15 repetitions with a 30-second hold and 5 seconds of relaxation. Participants were informed of their right to withdraw from the study at any stage without any consequences.

OUTCOME MEASUREMENT

The degree of lumbar lordosis was assessed to quantify the curvature of the lumbar spine. Lumbar ROM was measured to assess the flexibility and mobility of the lumbar spine during flexion and extension. Together, these outcome measures provided an objective evaluation of the effectiveness of the interventions in improving spinal alignment and lumbar mobility.

STATISTICAL ANALYSIS

The collected data were tabulated and analyzed using both descriptive and inferential statistics. All the parameters were assessed using statistical package for social science (SPSS) version 24, with a significance level of p value less than 0.05 and a 95% confidence interval set for all analysis. The Shapiro Wilktest was used to determine the normality of the data. In this study, Shapiro Wilk test showed that the data was normally distributed on the dependent values at $P > 0.05$. Hence parametric test was adopted. Paired t-test was adopted to find the statistical difference within the groups & Independent t-test (Student t-Test) was adopted to find statistical difference between the groups.

RESULT

A total of 30 female participants completed the study, with 15 in each group. Both 3D-MFR and Egoscue groups showed significant improvements in lumbar lordosis and range of motion after four weeks ($p \leq 0.05$), with greater improvement in the Egoscue group. The post-test lumbar lordosis angle was lower in the Egoscue group (38.53°) than in the 3D-MFR group (41.93°). Lumbar flexion (4.34 vs. 3.05) and extension (1.14 vs. 0.87) were also significantly higher in the Egoscue group, indicating superior improvement in spinal mobili**ty**

WITHIN-GROUP AND BETWEEN-GROUP ANALYSIS

The data were analyzed using SPSS version 24. Normality was assessed using the Shapiro–Wilk test, and the dependent variables were normally distributed ($p > 0.05$). Paired t-tests were used for within-group comparisons, while independent t-tests were used for between-group comparisons. Statistical significance was set at $p \leq 0.05$.

Table 1. Within-group comparison of pre-test and post-test outcomes

Outcome	Group A: Pre → Post	t	p	Group B: Pre → Post	t	p
Lumbar lordosis (°)	43.06 → 41.93	4.79	<0.001	42.20 → 38.53	15.78	<0.001
MMST Flexion (cm)	2.90 → 3.05	-4.55	<0.001	2.96 → 4.34	-9.63	<0.001
MMST Extension (cm)	0.666 → 0.866	-2.98	<0.001	0.613 → 1.14	-10.39	<0.001

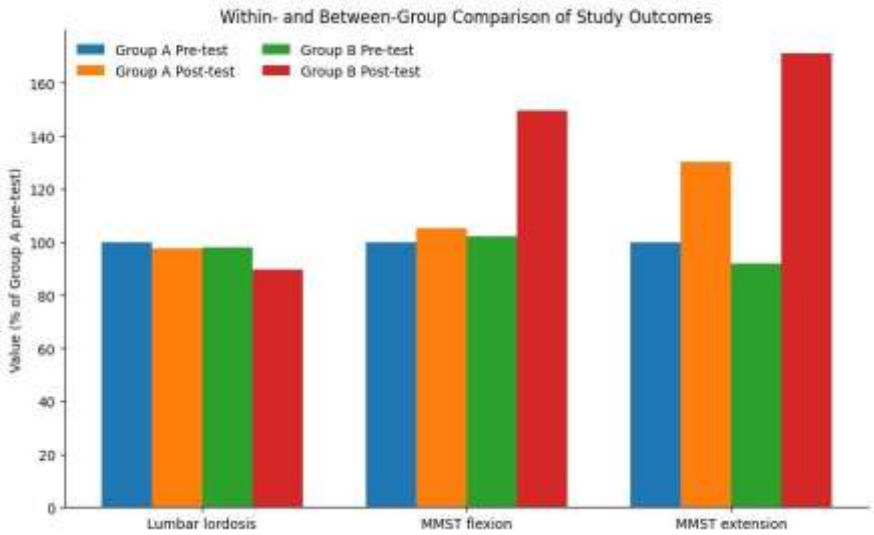
Within-group analysis demonstrated statistically significant pre-test to post-test changes in both groups for lumbar lordosis, MMST flexion, and MMST extension (all $p = 0.001$). Group B showed a greater magnitude of improvement across all measured outcomes.

Table 2. Between-group comparison of pre-test and post-test outcomes

Outcome	Pre-test p	Group A Post	Group B Post	Post-test p
Lumbar lordosis (°)	0.343	41.93	38.53	<0.001
MMST Flexion (cm)	0.807	3.05	4.34	<0.001
MMST Extension (cm)	0.612	0.866	1.14	<0.001

Between-group analysis showed no statistically significant differences at baseline for lumbar lordosis, MMST flexion, or MMST extension ($p > 0.05$). At post-test, statistically significant differences were observed for all three outcomes ($p = 0.001$), with greater improvement in Group B (Egoscue) than Group A (3D-MFR).

Graph 1. within and between groups comparison of study



DISCUSSION

The present study compared the effectiveness of Three-Dimensional Myofascial Release (3D-MFR) and Egoscue exercises in female college students with asymptomatic lumbar hyperlordosis. The results demonstrated that both interventions produced statistically significant improvements in lumbar lordosis angle and lumbar range of motion following four weeks of intervention ($p < 0.05$). However, participants who received the Egoscue exercise program showed significantly greater improvement than those treated with 3D-MFR. The post-test mean lumbar lordosis angle was lower in the Egoscue group ($38.53 \pm 1.50°$) than in the 3D-MFR group ($41.93 \pm 3.01°$).

Likewise, lumbar flexion and extension, measured using the Modified-Modified Schober's Test, improved significantly in both groups, with the Egoscue group demonstrating superior gains. These findings suggest that, although both interventions are beneficial, Egoscue exercises provide greater improvement in correcting lumbar hyperlordosis and enhancing spinal mobility. The superior outcomes observed In the Egoscue group may be attributed to its emphasis on restoring postural alignment through muscle re-education, correction of movement patterns, and improvement of flexibility and muscular balance.

The findings of the present study are consistent with those reported by Welling et al. (2024), who observed significant improvements in the Index of Lumbar Lordosis and Modified-Modified Schober's Test following corrective exercise interventions. Although the magnitude of improvement differed from that of the present study, the overall trend supports the effectiveness of exercise-based interventions in improving lumbar posture and spinal mobility. Similarly, Gayatri S. Kudchadkar et al. (2020) reported that both Egoscue and Pilates exercises significantly reduced the Index of Lumbar Lordosis and improved pelvic alignment compared with stabilization exercises.

These findings support the results of the present study, in which Egoscue exercises produced superior improvements in lumbar lordosis and lumbar spine mobility. The relatively smaller percentage improvement observed in the present study may be attributed to the shorter intervention duration, smaller sample size, and differences in participant characteristics and treatment protocols. Overall, the findings indicate that Egoscue exercises provide an effective conservative intervention for correcting asymptomatic lumbar hyperlordosis by improving postural alignment, muscle balance, flexibility, and lumbar spine mobility.

CONCLUSION

Within the limitations of this study, it can be concluded that the Egoscue exercise program is more effective than Three-Dimensional Myofascial Release for improving lumbar hyperlordosis and lumbar spine mobility among female college students with asymptomatic lumbar hyperlordosis.

ACKNOWLEDGEMENT

The authors sincerely thank the management, faculty, and staff of Revathi Institute of Physiotherapy for their valuable support and guidance. We also extend our gratitude to all the participants for their cooperation and participation in this study.

AUTHOR CONTRIBUTION

Pavithra A: Conceptualization, Methodology, Participant recruitment, Data collection, Formal analysis, Manuscript drafting.

Dr. Nithya V: Supervision, Methodology validation, Critical revision of the manuscript, Final approval of the manuscript.

Dr. P. Bright Alwin Victor: Research guidance, Manuscript review, Administrative support, Final approval of the manuscript.

CONFLICT OF INTEREST

The authors declare that there are no conflicts of interest regarding the publication of this study.

DATA AVAILABILITY

The datasets generated and/or analysed during the current study are available from the corresponding author upon reasonable request.

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