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ORIGINAL

Effects of Self-Stretching vs. Gym Ball Exercises for Managing Lower Back Pain Among Young Adult Male Gym Goers: A Randomized control trial

Efectos de los ejercicios de autoestiramientos frente a los ejercicios con pelota de gimnasia para el tratamiento del dolor lumbar en hombres jóvenes adultos que acuden al gimnasio: ensayo controlado aleatorio

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ABSTRACT

Introduction: low back pain was common among beginner gym-goers due to unfamiliar movement patterns, poor technique, and adaptation to equipment. Although self-stretching was a simple, self-directed intervention, its effectiveness compared with guided methods such as Swiss ball-assisted stretching remained unclear.
Method: sixty young adult males (18–30 years) with less than six months of gym experience and mild to moderate low back pain were randomly allocated to either a self-stretching group (Cat-Cow, Seated Forward Bend, Child's Pose, Standing Hamstring, and Lower Back Rotational Stretch) or a Swiss ball-assisted stretching group. Both groups underwent a six-week program. Pain intensity, flexibility, and functional mobility were assessed using the Visual Analogue Scale (VAS), Sit-and-Reach test, and Oswestry Disability Index (ODI).
Results: the self-stretching group demonstrated significantly greater improvements compared with the Swiss ball-assisted stretching group in VAS (p = 0,014), ODI (p = 0,007), and Sit-and-Reach scores (p = 0,008).
Conclusion: self-stretching proved to be more effective than Swiss ball-assisted stretching in reducing pain, improving flexibility, and enhancing functional mobility among beginner gym-goers.

Keywords: Newbie Gym-Goers; Lower Back Pain; Stretching Exercises; Gym Ball Exercises.

RESUMEN

Introducción: el dolor lumbar era frecuente entre los principiantes en el gimnasio debido a patrones de movimiento desconocidos, una técnica deficiente y la adaptación al equipo. Aunque el autoestiramiento era una intervención sencilla y autodirigida, su eficacia en comparación con métodos guiados, como el estiramiento asistido con pelota suiza, seguía sin estar clara.
Método: sesenta hombres jóvenes adultos (de 18 a 30 años) con menos de seis meses de experiencia en el gimnasio y dolor lumbar leve a moderado fueron asignados aleatoriamente a un grupo de autoestiramientos (gato-vaca, flexión hacia delante sentado, postura del niño, isquiotibiales de pie y estiramiento rotacional de la zona lumbar) o a un grupo de estiramientos asistidos con pelota suiza. Ambos grupos se sometieron a un programa de seis semanas. La intensidad del dolor, la flexibilidad y la movilidad funcional se evaluaron mediante la escala analógica visual (EVA), la prueba Sit-and-Reach y el índice de discapacidad de Oswestry (ODI).

Resultados: el grupo de autoestiramientos mostró mejoras significativamente mayores en comparación con el grupo de estiramientos asistidos con pelota suiza en las puntuaciones de la EAV (p = 0,014), el IOD (p = 0,007) y la prueba Sit-and-Reach (p = 0,008).
Conclusiones: el autoestiramiento demostró ser más eficaz que el estiramiento asistido con pelota suiza para reducir el dolor, mejorar la flexibilidad y aumentar la movilidad funcional entre los principiantes en el gimnasio.

Palabras clave: Principiantes en el Gimnasio; Dolor Lumbar; Ejercicios de Estiramiento; Ejercicios con Pelota de Gimnasia.

INTRODUCTION

Lower back pain (LBP) is a leading musculoskeletal complaint globally and a major cause of years lived with disability.[1,2] As pain or stiffness localized between the lower ribs and gluteal folds—with or without leg radiation—LBP is often categorized as acute (<6 weeks), subacute (6–12 weeks), or chronic (>12 weeks).[3,4,5] While some cases result from identifiable pathologies (e.g., disc herniation or stenosis), nearly 90 % are classified as non-specific and related to mechanical stress or postural dysfunction.[6]

Among novice gym-goers, particularly young adult males, the prevalence of LBP is notably high—largely due to poor lifting techniques, abrupt increases in training intensity, and insufficient mobility or core strength.[7,8] Exercises such as squats and deadlifts, when performed incorrectly, generate excessive lumbar load, leading to microtrauma and strain.[9] Inadequate warm-up routines, imbalances in hip and spinal mobility, and lack of professional supervision further elevate the injury risk.[10] Psychosocial factors, including fear-avoidance beliefs, low self-efficacy, and performance pressure, can exacerbate LBP symptoms or delay recovery.[11] Early LBP, if not effectively addressed, can hinder exercise adherence and increase the likelihood of chronic pain, thereby reducing overall physical and psychological well-being. Social influences, such as performance pressure or unrealistic fitness expectations on social media, often drive individuals to train aggressively, disregarding early symptoms of overuse injuries.[12] In response to initial pain, some beginners either abandon training or persist unsafely, leading to worsening conditions.

Given the rising incidence of LBP among young gym-goers,[13] early intervention strategies are essential for reducing injury progression and improving adherence to physical activity. Stretching exercises, especially self-directed routines, offer a non-invasive, low-cost approach to enhance lumbar flexibility, neuromuscular coordination, and posture control.[14,15] Unlike passive treatments or pharmacologic interventions, self-stretching promotes active rehabilitation and body awareness—critical elements for sustainable spinal health. Prior research supports the use of targeted flexibility programs in alleviating LBP symptoms and improving functional outcomes in both athletic and general populations.[16,17] In parallel, Swiss ball-based exercises (also known as gym ball or stability ball exercises) have gained attention in rehabilitation due to their ability to activate deep stabilizing muscles, enhance proprioception, and improve core strength and posture.[18,19] Incorporating unstable surface training using Swiss balls may lead to greater neuromuscular engagement and dynamic lumbar control, which is beneficial for both pain reduction and functional restoration in individuals with non-specific LBP.[20] Given these benefits, the present study evaluates the comparative efficacy of self-stretching versus Swiss ball-assisted stretching in reducing LBP, improving flexibility, and enhancing functional mobility among young adult male gym beginners. The goal is to identify effective early-phase interventions that can prevent injury progression and promote sustainable exercise participation.

METHOD

Before recruitment approval was obtained from an institutional research ethics committee and informed consent was obtained from all the participants. All the subjects were informed in detail about the objectives and significance of the study and written informed consent was obtained before enrolling the patients into the study. The declaration of consent was on par with Helsinki's regulation. The study is characterized as an experimental study including a randomized control trial - parallel group design – single-blind study, with a total of 118 participants. The participants were selected according to their convenient accessibility. A power analysis was performed a sample size of 118 was found to be sufficient at a power of 80,14 % with an effect size of 0,5 at a significance level of 0,05

A total of 150 young adult male gym beginners were assessed for eligibility to participate in the study. Of these, 30 individuals were excluded—20 did not meet the inclusion criteria and 10 declined to participate. The remaining 120 participants were enrolled and randomly allocated into two equal groups: Group A (n = 60) received the self-stretching exercise intervention, and Group B (n = 60) received the gym ball exercise intervention. All participants initially received their allocated interventions. During the follow-up period, 2

participants from Group A and 1 participant from Group B were lost due to personal reasons and inability to complete post-test assessments. Consequently, data from 58 participants in Group A and 59 participants in Group B were included in the final analysis. Males aged 18–30 with ≤6 months gym experience and mild-to-moderate LBP (VAS 1–6) were included for the study. Exclusion criteria are like recent back surgery or severe pain needing clinical intervention.

The independent variables included age, height, and weight, while the dependent variables comprised, Baseline pain (Visual Analogue Scale -VAS), back flexibility (SitandReach), and functional disability (Oswestry Disability Index- ODI). Pain was assessed using the Visual Analog Scale (VAS), a 0–10 scale where 0 represents no pain and 10 indicates the worst possible pain.[21] Flexibility was measured through the Sit and Reach Test,[22] with scores recorded in centimetres, which reflects hamstring and lower back flexibility. Functional mobility was evaluated using the Oswestry Disability Index (ODI),[23] a widely used tool scored from 0 to 100 %, where higher percentages indicate greater disability. Pre- and post-intervention scores within each group were analysed using paired t-tests to determine statistically significant changes over time. Additionally, independent t-tests were conducted to assess differences between Group A and Group B post-intervention. A significance level of $p < 0,05$ was considered statistically meaningful for all analyses.

Interventions

Procedure

Group A: self-stretching exercises (Cat-Cow, Seated Forward Bend, Child's Pose, Standing Hamstring Stretch, Lower Back Rotational Stretch); Group B: Swiss ball-assisted stretches (Back Extension Over Ball, Supine Spine Stretch, Child's Pose with Ball, Lat and Spine Stretch, Knee-to-Chest on Ball). Each session included warm-up and cool-down for six weeks, three times per week after 5 minutes of warming up. Sessions were overseen by certified physiotherapists with experience in musculoskeletal rehabilitation and trained in gym-based interventions. Interventions were delivered face-to-face in a gym setting, on an individual basis. Conducted in a physiotherapy and fitness centre equipped with required tools like mats, Swiss balls, and open floor space. Exercises were standardized across participants. No individual tailoring was done. No modifications were made during the study. Adherence was monitored by attendance logs and physiotherapist supervision. Participants were reminded weekly and encouraged to follow routines strictly. All participants completed the intervention as planned. High adherence was recorded; data was used for analysis only from those who attended at least 90 % of sessions. The Group a and group B exercise protocols are provided in the below table 1 and 2.

Table 1. Self stretching exercises – Group A [24,25,26,27,28,29]

S.No	Exercise	Sets	Repetition
1	Cat-Cow Stretch	3	10
2	Seated Forward Bend	2	5
3	Child's Pose	3	10
4	Standing Hamstring Stretch	2	8
5	Lower Back Rotational Stretch	3	10

Table 2. Swiss ball exercises – Group B [30,31,32,33]

S. No	Exercise	Sets	Repetition
1	Back Extension Over Ball	2	5
2	Supine Spine Stretch	2	5
3	Child's Pose with Ball	3	4
4	Lat & Spine Stretch with Ball on each side	2	2
5	Knee-to-Chest Stretch on Ball	3	5

Warm Up Exercises

Before starting the main stretching exercises, it's important to prepare the body with a gentle warm-up. The following exercises are designed to increase circulation, activate key muscle groups, and improve mobility—all without placing stress on the lower back. Pelvic Tilts (Supine) for 1–2 minutes, Marching in Place for 2 minutes, Arm swinging for 30–60 seconds.

Cool Down Exercises

After completing stretching session, it's important to help body gradually return to a relaxed state. These

cool-down exercises are calming and restorative, designed specifically for individuals managing lower back pain. Knee-to-Chest Stretch- 30 seconds per leg, Supine Deep Breathing – 1minute, Seated Forward Fold (Supported) – 30 seconds.

Table 3. Baseline Characteristics Demographic data

Variable	Group A (Mean ± SD)	Group B (Mean ± SD)	p - value
Age (years)	24,1 ± 3,4	23,9 ± 3,6	0,712
Height (cm)	172,8 ± 5,5	173,4 ± 6,1	0,532
Weight (kg)	68,2 ± 6,7	67,5 ± 7,2	0,486

The baseline demographic characteristics of the participants in both groups were comparable, as shown in table 3. The mean age in Group A was 24,1 ± 3,4 years, while in Group B it was 23,9 ± 3,6 years (p = 0,712), indicating no statistically significant difference. The mean height of participants was 172,8 ± 5,5 cm in Group A and 173,4 ± 6,1 cm in Group B (p = 0,532). Similarly, the mean body weight was 68,2 ± 6,7 kg in Group A and 67,5 ± 7,2 kg in Group B (p = 0,486). All p-values exceeded 0,05, confirming that there were no significant differences between the groups at baseline. This suggests that the randomization was effective, and the groups were well balanced prior to the intervention.

RESULTS

Group A - Pre and Post-test Results

Table 4. Statistical Analysis of Pre and Post test values of VAS, ODI and Sit and Reach test of Group A

Outcome Measures		Paired t test				
		Mean	M.D	S.D	T	P
VAS	Pre test	6	2,3	1,27	14,02	0,0001
	Post test	3,7				
ODI	Pre test	16,5	6,6	2,97	17,22	0,0001
	Post test	9,9				
Sit & reach	Pre test	20,9	8,5	4,2	15,69	0,0001
	Post test	28,4				

As shown in table 4, The statistical analysis using paired t-tests revealed significant differences between pre-test and post-test values across all outcome measures, indicating the effectiveness of the intervention. For the Visual Analog Scale (VAS), the mean pain score reduced from 6,0 to 3,7 post-intervention, with a mean difference of 2,3 and a p-value of 0,001, confirming a statistically significant reduction in perceived pain levels. Similarly, the Oswestry Disability Index (ODI) showed a substantial decrease from a pre-test mean of 16,5 to a post-test mean of 9,9, yielding a mean difference of and a highly significant p-value of 0,0001, reflecting improved functional status and reduced disability. The Sit and Reach test, used to assess flexibility, demonstrated a significant increase in performance, with scores rising from 20,9 cm to 28,4 cm post-intervention. This improvement corresponded to a mean difference of 8,5 and a p-value of 0,001, indicating enhanced flexibility among the participants. Since all p-values are less than 0,05, the changes observed in pain, disability, and flexibility are statistically significant and support the hypothesis that the intervention was effective in improving these outcomes.

Group B - Pre and Post-test Results

Table 5. Statistical Analysis of Pre and Post test values of VAS, ODI and Sit and Reach test of Group B

Outcome Measures		Paired t test				
		Mean	M.D	S.D	t	P
VAS	Pre test	6,1	1,6	2,1	5,90	0,001
	Post test	4,5				
ODI	Pre test	16,1	4,1	5,0	6,36	0,001
	Post test	12,0				
Sit & reach	Pre test	20,4	5,9	4,2	9,13	0,001
	Post test	26,3				

As shown in table 5, The paired *t*-test analysis of Group B's pre- and post-test outcomes revealed statistically significant improvements in pain perception and functional disability, while changes in flexibility did not reach statistical significance. The Visual Analog Scale (VAS) scores demonstrated a significant reduction in pain intensity, with a mean decrease of 2,1 points (from 6,1 to 4,5, *p* = 0,001), indicating that the intervention had a strong analgesic effect. Similarly, the Oswestry Disability Index (ODI) showed a clinically meaningful improvement, with a mean reduction of 4,1 points (from 16,1 to 12,0, *p* = 0,001), suggesting enhanced functional ability in daily activities. A notable mean of 5,9 cm in the Sit and Reach test (from 20,4 to 26,3), the improvement was statistically significant (*p* = 0,001).

Table 6. Post-Test Data Analysis Report for Group A and Group B (Comparison of two independent means)

Outcome Measure	Group A (Mean ± SD)	Group B (Mean ± SD)	T value	P value
VAS Scale	3,7 ± 1,27	4,5 ± 2,1	2,52	< 0,014
ODI Score	9,9 ± 2,97	12,1 ± 5,0	2,80	< 0,007
Sit and reach	28,4 ± 4,2	1.3 ± 4,2	2,74	< 0,008

As shown in table 6, post-intervention comparisons between Group A and Group B were conducted using independent t-tests for VAS, ODI, and Sit and Reach outcomes. The results showed a statistically significant difference in pain levels as measured by the Visual Analog Scale (VAS), with Group A demonstrating lower post-test scores (Mean ± SD: 3,7 ± 1,27) compared to Group B (4,5 ± 2,1), t = 2,52, p = 0,014. Similarly, for disability scores assessed by the Oswestry Disability Index (ODI), Group A (9,9 ± 2,97) showed significantly better outcomes than Group B (12,0 ± 5,0), t = 2,80, p = 0,007. A significant improvement was also noted in flexibility as measured by the Sit and Reach test, where Group A achieved higher scores (28,4 ± 4,2) than Group B (26,3 ± 4,2), t = 2,74, p = 0,008. These findings indicate that Group A showed greater improvements across all post-test outcomes compared to Group B. Finally, both the groups demonstrated statistically significant improvements within their respective groups following the intervention period (p < 0,05). Group A, which performed self-stretching exercises, showed a mean reduction of approximately 2,3 points in VAS scores, an average increase of about 8,5 cm in the Sit and Reach test, and a reduction of around 6,6 points in ODI scores, indicating substantial improvements in pain relief, flexibility, and functional ability. Group B, which followed an alternative exercise regimen, also exhibited improvements, with a mean reduction of 1,6 points in VAS, an increase of 5,9 cm in Sit and Reach, and a decrease of 4,1 points in ODI. However, these changes were comparatively less pronounced than those observed in Group A.

Between-group comparisons of post-test scores revealed that Group A achieved significantly better outcomes than Group B in all three measures. Specifically, significant differences were found in VAS (t = 2,52, p = 0,014), ODI (t = 2,80, p = 0,007), and Sit and Reach scores (t = 2,74, p = 0,008). These results highlight the superior effectiveness of self-stretching exercises in managing lower back pain, improving flexibility, and enhancing functional mobility among young adult male gym beginners.

DISCUSSION

The results of this study suggest that self-stretching exercises are a highly effective non-pharmacological strategy for managing lower back pain (LBP) among young adult male gym beginners. Participants in Group A, who underwent a structured self-stretching protocol, experienced greater improvements across all outcome measures—including pain (VAS), flexibility (Sit and Reach), and functional mobility (ODI)—compared to Group B. These findings reinforce the role of active flexibility interventions in enhancing musculoskeletal function and reducing discomfort in physically active but inexperienced populations.

The significant reduction in pain levels among Group A aligns with findings from studies that suggest stretching may improve blood circulation, reduce muscular tension, and promote endorphin release, all of which contribute to pain relief. Furthermore, increased flexibility in the hamstrings, lumbar spine, and hip flexors can decrease mechanical load on the lumbar region, which is particularly beneficial during dynamic gym movements such as squats or deadlifts.

The notable improvement in functional mobility, as evidenced by lower ODI scores in Group A, suggests that targeted stretching may also enhance proprioception, joint range of motion, and postural alignment—factors essential for safe and efficient exercise performance.[34,35] Given that early-stage LBP is often attributed to poor biomechanics and muscular imbalances, particularly among novice exercisers, correcting these deficits through structured stretching likely contributes to both short-term relief and long-term prevention.

In addition to traditional stretching, gym ball exercises may offer complementary benefits by promoting core stability, balance, and neuromuscular coordination. Recent literature supports their inclusion as a dynamic tool for lumbar stabilization training, which has been shown to reduce LBP intensity and improve spine function.[31,32]

The psychosocial dimension of LBP must also be considered. Fear of pain, low self-efficacy, and performance anxiety in gym environments can exacerbate physical symptoms. Self-directed exercise routines like stretching not only empower individuals to take control of their symptoms but may also alleviate anxiety through movement-based mindfulness and self-regulation.

These findings underscore the value of non-invasive, low-cost interventions such as self-stretching in managing early LBP. Incorporating these exercises into gym orientation programs or beginner fitness protocols may reduce injury incidence and enhance adherence by building a foundation of mobility and body awareness.

CONCLUSION

A six-week structured self-stretching program significantly reduced lower back pain, improved flexibility, and enhanced functional mobility among young adult male gym beginners. Compared to Swiss ball-assisted stretches, the self-stretching protocol was more accessible, effective, and practical in a beginner gym environment.

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