Research Article

A Comparative Study of Conventional Back Care Exercises and Swiss Ball Exercises in Sports Person with Low Back Pain

Yadveer Kaur[1*], Pushpdeep Singh[2], Apurva[3], Sanyam[4], Ritik[5], Misha[6]

[1*]Assistant professor, Dasmesh college of physiotherapy, Faridkot, Email id: yadveer42@gmail.com
[2]Professor, Dasmesh college of physiotherapy, Faridkot, Email id: pushpdeepdr@gmail.com
[3]Student, Dasmesh college of physiotherapy, Faridkot, Email id: Apurvadevgan@gmail.com
[4] Student, Dasmesh college of physiotherapy, Faridkot, Email id: sanyamgupta188@gmail.com
[5]Student, Dasmesh college of physiotherapy, Faridkot, Email id: rithiksachdeva01634@gmail.com
[6]Student, Dasmesh college of physiotherapy, Faridkot, Email id: m94899092@gmail.com
***Corresponding Author**: Yadveer Kaur, Email id: yadveer42@gmail.com

Abstract

Background: Low back pain is a common musculoskeletal condition associated with pain, activity limitation and disability. Exercise-based rehabilitation is a central component of conservative management, although the choice of exercise programme varies across clinical settings. Conventional back care exercises and Swiss ball-based exercises are both used to address symptoms and trunk function.

Objective: To compare the effects of conventional back care exercises and Swiss ball exercises on pain intensity and functional disability in individuals with mechanical low back pain.

Methods: This study was described in the source presentation as a two-group, parallel, randomised controlled trial conducted in the outpatient department of Dasmesh College of Physiotherapy, Faridkot. Forty male sports person aged 20–40 years with non-radiating mechanical low back pain were allocated to Group A (n=20), receiving moist heat followed by conventional back care exercises, or Group B (n=20), receiving moist heat followed by Swiss ball exercises. Both groups received ergonomic advice and attended 15 sessions over three weeks (five sessions per week). Pain was assessed using the Visual Analogue Scale (VAS), and disability using the Modified Oswestry Disability Index (MODI), before and after the intervention. The presentation reports independent-samples comparisons between groups at baseline and post-intervention.

Results: The finding of the present study indicated that after statistical analysis there was significant difference between pre and post physical therapy interventions in both groups. However, Group A receiving Conventional back care exercises showed better results than Group B receiving Swiss ball exercises.

Conclusion: Both exercise programmes were associated with lower mean pain and disability scores after three weeks. The reported post-treatment comparisons favoured conventional back care exercises; however, the absence of raw data, confidence intervals, documented within-group tests and follow-up limits the strength of this conclusion. Larger trials with transparent randomisation, complete statistical reporting and longer follow-up are warranted.

Keywords: low back pain; mechanical low back pain; conventional back care exercises; Swiss ball; core stability; visual analogue scale; Oswestry Disability Index.

INTRODUCTION

Low back pain (LBP) is a prevalent musculoskeletal complaint and an important contributor to activity limitation and disability. It is commonly described as pain, muscle tension or stiffness localised between the lower rib margin and the inferior gluteal folds, with or without symptoms extending into the lower limb. The clinical presentation is heterogeneous, and symptoms may involve multiple anatomical and neurophysiological mechanisms. Consequently, assessment and management require consideration of the individual's symptoms, functional limitations and relevant psychosocial factors (Koes, van Tulder and Thomas, 2006; Allegri et al., 2016). The diagnostic and therapeutic management of LBP has historically varied among healthcare professionals and across countries. This variation reflects, in part, the diverse clinical presentations and the range of conservative interventions used in practice (Koes, van Tulder and Thomas, 2006). For many people with non-specific or mechanical LBP, exercise-based rehabilitation is an important component of conservative care. Exercise programmes may include mobility exercises, stretching, strengthening, trunk conditioning and motor-control training.

Conventional back care programmes commonly combine lumbar flexion and extension movements with exercises intended to improve trunk and pelvic muscle function. Examples include prone-on-elbows positioning, bridging, posterior pelvic tilting and single-knee-to-chest movements. The specific exercise selection should be guided by clinical assessment and patient tolerance rather than applied as a uniform protocol to every presentation.

Swiss balls are used in rehabilitation to introduce an unstable or compliant support surface during trunk and limb exercises. Exercises such as pelvic tilting, bridging, trunk rotation and hamstring curls can challenge postural control and trunk muscle coordination. The proposed rationale is that maintaining control while interacting with the ball may increase the demand on stabilising musculature. However, a greater balance challenge does not

automatically establish superior clinical outcomes.

Previous comparative research has explored Swiss ball exercise as an alternative to McKenzie-based exercise in people with chronic LBP. Villarin et al. (2020) reported no significant difference between the two exercise approaches in their sample of poultry workers, suggesting that Swiss ball exercise may be a feasible alternative in that setting. Raghav and Singh (2017) reported improvements in pain, disability and muscle endurance following a Swiss ball programme in people with mechanical low back ache. Other work has examined core stabilisation on a Swiss ball compared with floor-based exercise (Balakrishnan, Yazid and Mahat, 2016).

Despite the use of both conventional back care and Swiss ball exercises in clinical practice, their comparative effects may depend on the selected exercises, treatment dose, patient characteristics and outcome measures. The present study therefore compared the two programmes over a three-week intervention period, using pain intensity and functional disability as the principal outcomes.

NEED OF STUDY

Physiotherapists frequently need to select an exercise approach that is practical, acceptable and appropriate to the patient's functional presentation. Conventional back care exercises can be performed on a treatment couch or exercise mat with minimal equipment, whereas Swiss ball exercises require access to an appropriately sized ball and sufficient balance and movement control. A direct comparison may help clinicians understand whether the additional equipment and balance demands of Swiss ball training are associated with greater short-term improvement than a conventional exercise programme. The present study contributes preliminary clinical observations from an outpatient physiotherapy setting. Its small sample and short treatment period mean that the findings should be interpreted as exploratory rather than definitive.

AIM AND OBJECTIVES

Aim: To compare the effects of conventional back care exercises and Swiss ball exercises on pain and functional disability in patients with low back pain.

Objectives:

- To assess changes in pain intensity following conventional back care exercises.
- To assess changes in pain intensity following Swiss ball exercises.
- To assess changes in functional disability following each exercise programme.
- To compare the reported post-intervention VAS and MODI scores between the two groups.

HYPOTHESIS

Null hypothesis: There is no statistically significant difference between conventional back care exercises and Swiss ball exercises in their effects on pain intensity and functional disability.

Alternative hypothesis: There is a statistically significant difference between the two exercise programmes in their effects on pain intensity and functional disability.

MATERIALS AND METHODS

Study design and setting

The source presentation identifies the study as a two-group, parallel, randomised controlled trial with 1:1 allocation. Participants were recruited from the outpatient department of Dasmesh College of Physiotherapy, Faridkot. The presentation also describes the sampling approach as convenience sampling followed by random allocation. The dates of recruitment and intervention were not provided.

Participants and sample size

A total of 40 participants were included, with 20 participants in each group. The source presentation specifies male participants aged 20–40 years with clinically diagnosed mechanical low back pain and non-radiating symptoms. The method used to calculate the sample size was not reported; therefore, the sample should be described as the number recruited rather than as a statistically justified sample size.

Eligibility criteria

Inclusion criteria reported in the presentation were: age 20–40 years; male athletes ; chief complaint of low back pain without radiation; average pain intensity of at least 4/10 on the VAS; MODI disability score of at least 20%; male sex; and a clinical diagnosis of mechanical low back pain.

Exclusion criteria reported were diagnosed or suspected tumour, metabolic disease, ankylosing spondylitis, spinal fracture or prolapsed intervertebral disc; clinically diagnosed structural or functional deformity of the lower limbs; spinal or lower-limb surgery within the previous six months; congenital spinal anomaly such as spina bifida; inability to comply with the treatment schedule; non athletes and Pott's spine.

Allocation and ethical considerations

The presentation states that participants were randomly assigned to Group A or Group B after written informed consent. It does not describe the random sequence generation method, allocation concealment, assessor blinding, trial registration or institutional ethics committee approval. These details must be retrieved from the original study records and added before journal submission. They must not be inferred or retrospectively invented.

Interventions

Both groups received ergonomic advice and moist heat application before exercise. Advice included avoiding prolonged low sitting with hip and knee flexion beyond 90 degrees, avoiding cross-legged sitting where it aggravated symptoms, and avoiding forward bending with the knees extended. The presentation reports 15 treatment sessions over three weeks, at five sessions per week.

Group A: moist heat and conventional back care exercises

Participants in Group A (n=20) received a moist hydrocollator pack over the lumbar region in prone lying. The pack was reported to be maintained at approximately 55°C, wrapped in four layers of towel and applied for 20 minutes. Skin condition and patient comfort should be monitored during heat application; the precise temperature at the skin interface was not documented.

The conventional exercise programme comprised the following movements:

Prone on elbows: The participant lay prone and raised the upper trunk by supporting the body on the forearms, while keeping the pelvis in contact with the treatment surface.

Bridging: In crook lying, the participant activated the gluteal muscles and raised the pelvis from the surface in a controlled manner.

Posterior pelvic tilt: In supine crook lying, the participant gently activated the abdominal and gluteal muscles to tilt the pelvis posteriorly and flatten the lower back towards the support surface.

Single knee to chest: In supine lying, the participant flexed one hip and knee and gently brought the knee towards the chest.

The presentation reports 10 repetitions per exercise, with a 15–20-second hold and 10 seconds of relaxation. It does not clearly state whether all exercises were performed at every session or whether progression was individual.

Group B: moist heat and Swiss ball exercises

Participants in Group B (n=20) received the same moist heat procedure as Group A, followed by Swiss ball exercises. The programme comprised:

Pelvic tilt: In supine lying with the feet supported, the participant gently activated the abdominal muscles and performed a controlled pelvic tilt.

Swiss ball bridging: In supine lying, the heels were placed on the ball and the participant raised the pelvis while attempting to maintain control of the ball.

Side-to-side ball rotation: In supine lying, the participant held the ball between the legs and moved it in a controlled manner from side to side.

Swiss ball hamstring curl: With the heels on the ball, the participant raised the pelvis and rolled the ball towards the body by flexing the knees, then returned to the starting position.

The presentation reports 10 repetitions per exercise, with a 5–10-second hold and five seconds of relaxation. The exact ball size, progression criteria, supervision details and total exercise-session duration were not reported.

Outcome measures

Visual Analogue Scale (VAS): Pain intensity was assessed using a 100-mm horizontal visual analogue scale, with 0 representing no pain and 100 representing the worst imaginable pain. The distance from the zero anchor to the participant's mark is measured in millimetres. Huskisson (1974) described the VAS as a sensitive method for measuring pain intensity.

Modified Oswestry Disability Index (MODI): Functional disability associated with low back pain was assessed using the modified Oswestry questionnaire. It contains 10 sections addressing activities such as personal care, lifting, walking, sitting, standing, sleeping and social participation. Scores are conventionally expressed as a percentage, with higher scores indicating greater disability. The precise version and scoring procedure used in this study should be confirmed against the questionnaire administered. Fritz and Irrgang (2001) examined the measurement properties of a modified Oswestry low back pain disability questionnaire.

Assessment schedule

VAS and MODI were recorded at baseline and at the end of the third week. No intermediate assessment or longer-term follow-up was reported. The presentation states that participants were instructed not to receive other pharmacological or non-pharmacological treatment during the intervention period; adherence to this instruction and any co-interventions were not quantified.

Statistical analysis

The presentation reports independent-samples (unpaired) t-tests for comparisons between Group A and Group B at baseline and post-intervention. A significance threshold of 0.05 was used, with a stated critical t value of approximately 2.02 at 38 degrees of freedom. The presentation does not provide the statistical software, assumption checks, confidence intervals, effect sizes, or the within-group paired analyses referred to in its discussion. The reported p-values are reproduced below as supplied and have not been independently recalculated from raw observations.

RESULTS

Forty participants were included in the reported analysis, with 20 participants in each group. The available presentation provides group means and standard deviations for VAS and MODI at baseline and after three weeks.

TABLE 1: Modified Oswestry Disability Index

Statistic	Group A: Pre	Group B: Pre	Group A: Post	Group B: Post
Mean	32.50	29.35	14.90	18.75
SD	6.533	7.583	3.567	6.835
n	20	20	20	20
Minimum	20	14	4	6
Maximum	42	42	20	30

The reported baseline comparison was not statistically significant (t=1.407, p=0.1674). The reported post-intervention comparison was statistically significant (t=2.233, p=0.0315), with a lower mean MODI score in Group A than Group B. The mean reduction calculated descriptively from the reported group means was 17.60 points in Group A and 10.60 points in Group B. These descriptive changes are not substitutes for a paired or baseline-adjusted treatment-effect analysis.

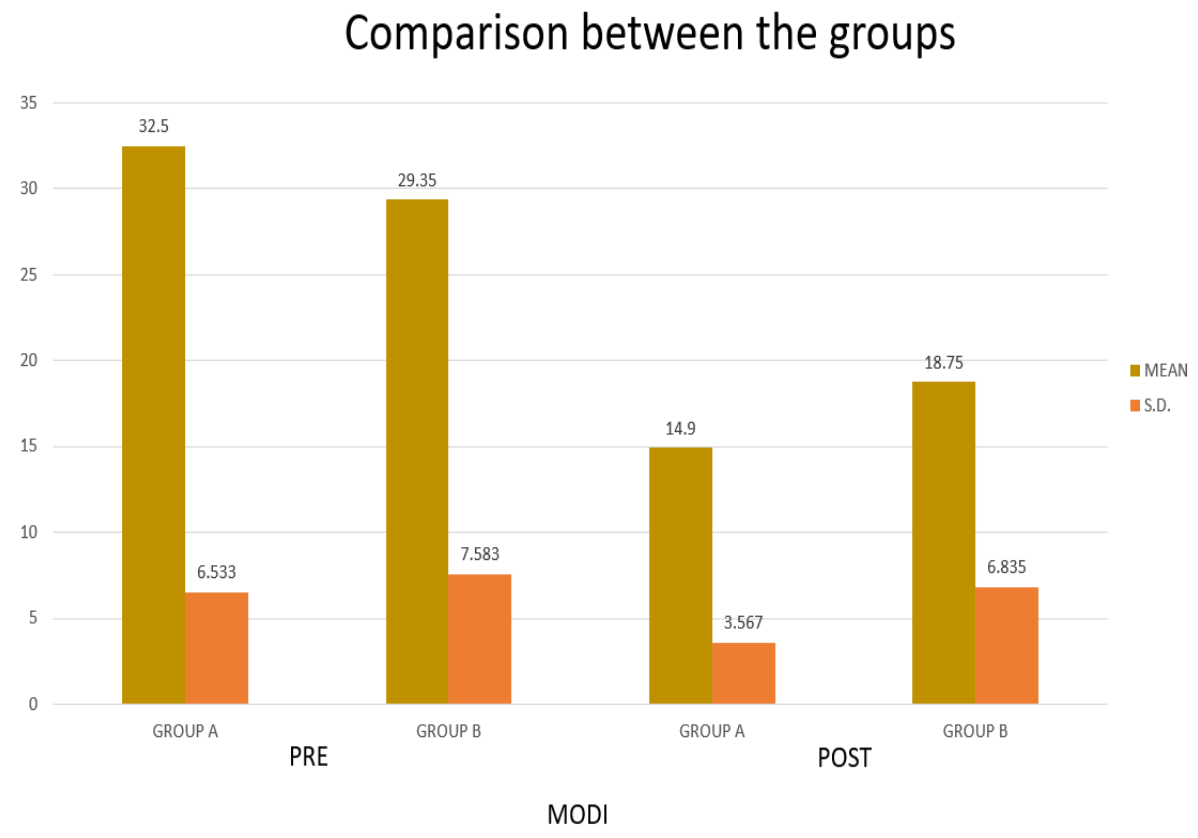


FIG 1: Graphical representation of comparison of MODI of Group A and Group B

TABLE 2: Visual Analogue Scale

Statistic	Group A: Pre	Group B: Pre	Group A: Post	Group B: Post
Mean	6.50	6.00	1.60	2.10
SD	1.000	1.338	0.754	0.718*
n	20	20	20	20
Minimum	5	2	1	1
Maximum	8	8	3	3

The reported baseline comparison was not statistically significant (t=1.339, p=0.1886). The reported post-intervention comparison was statistically significant (t=2.147, p=0.0382), with a lower mean VAS score in Group A than Group B. The mean reduction calculated descriptively from the reported group means was 4.90 points in Group A and 3.90 points in Group B.

*Data-verification note: The VAS table lists the post-intervention SD for Group B as 0.718, whereas the graph data in the presentation appears to show 2.8. The table value is reproduced here but remains unverified. The original dataset or statistical output must be checked before submission.

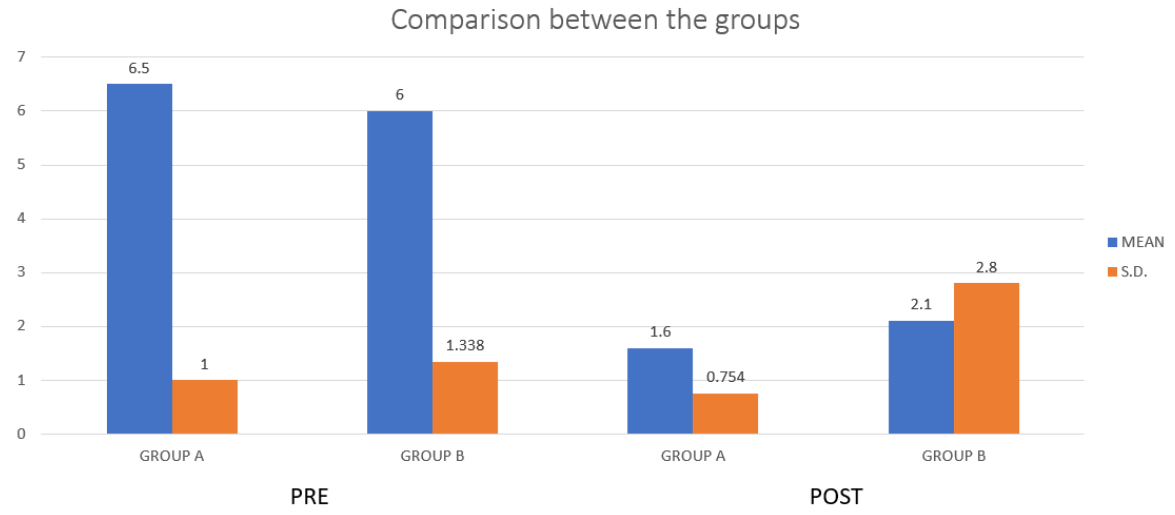


FIG 2: Graphical representation of comparison of VAS of Group A and Group B

Summary of reported between-group tests

Outcome	Time point	t statistic	Reported p value	Interpretation reported in source
MODI	Baseline	1.407	0.1674	Not significant
MODI	Post-intervention	2.233	0.0315	Significant
VAS	Baseline	1.339	0.1886	Not significant
VAS	Post-intervention	2.147	0.0382	Significant

The results above represent between-group comparisons at each time point. A significant post-treatment difference alone does not establish that the difference in change from baseline was statistically significant. An analysis of covariance or a group-by-time model, using participant-level data, would provide a more appropriate estimate of the comparative intervention effect.

DISCUSSION

This study compared conventional back care exercises with Swiss ball exercises in 40 male participants with mechanical low back pain. Both groups demonstrated lower mean VAS and MODI scores at the end of the three-week intervention than at baseline. The reported post-intervention between-group comparisons were statistically significant and favoured conventional back care exercises, as Group A had lower mean pain and disability scores at the final assessment.

The descriptive reduction in VAS was 4.90 points in Group A and 3.90 points in Group B, while the descriptive reduction in MODI was 17.60 and 10.60 points, respectively. These differences suggest a greater numerical improvement in the conventional exercise group. However, because the original participant-level data and within-group statistical outputs were not available for this manuscript, the magnitude and precision of the comparative treatment effect cannot be confirmed. The results should therefore be interpreted cautiously.

Conventional back care exercises in this study included lumbar extension positioning, bridging, posterior pelvic tilting and single-knee-to-chest movements. These exercises provide a relatively simple programme that can be performed on a mat or treatment couch. Exercise selection for low back pain should nevertheless be individualised according to symptom response, functional capacity and clinical assessment. A standardised programme may not be equally appropriate for all patients.

Swiss ball exercises are intended to challenge trunk control during movements performed on a less stable support surface. Raghav and Singh (2017) reported improvements in pain, disability and muscle endurance following a six-week Swiss ball programme in individuals with mechanical low back ache. Villarin et al. (2020), in a study involving poultry workers with chronic low back pain, found no significant difference between Swiss ball and McKenzie exercise groups. Their findings support the possibility that Swiss ball exercise can be an alternative exercise approach, but they do not establish that it is superior to conventional back care exercises.

Balakrishnan, Yazid and Mahat (2016) examined core stabilisation exercises performed on the floor and on a Swiss ball in individuals with non-specific low back pain. This work provides a rationale for considering the exercise surface and task demands when designing a trunk-conditioning programme. However, the present study did not directly measure trunk muscle activation, endurance, balance or motor control. It is therefore not possible to attribute the observed changes in pain and disability to a specific neuromuscular mechanism.

The use of moist heat in both groups means that the observed pre–post changes cannot be attributed to exercise alone. Heat was a shared co-intervention, and the study did not include a group receiving exercise without heat. Funk et al. (2001) investigated moist heat in relation to hamstring flexibility, but that study does not directly establish the effectiveness of lumbar heat application for low back pain. The shared heat intervention should therefore be acknowledged as part of the treatment package rather than treated as an independently proven explanation for improvement.

The findings are broadly consistent with the view that exercise-based approaches can be useful components of conservative low back pain management. Nevertheless, the present results should not be interpreted as definitive evidence that conventional back care exercises are clinically superior to Swiss ball exercises. The sample was small and restricted to men aged 20–40 years, the intervention lasted only three weeks, no follow-up was reported, and the statistical analysis available in the presentation is incomplete. In addition, the discrepancy in the Group B post-treatment VAS standard deviation needs resolution.

LIMITATIONS

The sample size was small (40 participants), which limits statistical power and the precision and generalisability of the findings.

The study included only male participants aged 20–40 years from a single outpatient physiotherapy setting; the findings may not apply to women, other age groups or wider populations.

The intervention period was limited to three weeks, and no follow-up assessment was reported; therefore, the persistence of treatment effects is unknown.

Only pain intensity and self-reported disability were assessed. Other relevant outcomes, such as lumbar range of motion, trunk muscle endurance, activity performance and quality of life, were not measured.

Potential confounding factors, including occupational demands, physical activity, psychosocial factors and adherence to home or ergonomic advice, were not reported in sufficient detail.

The random sequence generation, allocation concealment, assessor blinding, trial registration and ethics approval details were not available in the source presentation.

Participant-level data were unavailable for independent verification, and the post-treatment Group B VAS standard deviation differs between the table and graph data.

The reported independent t-tests compare groups at baseline and post-treatment; the available material does not provide a complete analysis of within-group change or a baseline-adjusted between-group treatment effect.

CONCLUSION

In this 40-participant comparative study, mean pain and disability scores decreased in both the conventional back care exercise group and the Swiss ball exercise group after three weeks of treatment. The reported post-intervention comparisons favoured conventional back care exercises for both VAS and MODI. However, incomplete statistical reporting, the absence of raw data, the short intervention period and a discrepancy in one reported standard deviation limit the certainty of this conclusion. The findings provide preliminary support for both approaches as components of physiotherapy management, but larger, methodologically rigorous trials are required before making firm recommendations about comparative effectiveness.

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