

COMPARATIVE EFFECTIVENESS OF BALANCE TRAINING EXERCISES AND YOGA THERAPY ON BALANCE AND COORDINATION AMONG HEMIPLEGIC POST-STROKE PATIENTS: A RANDOMIZED CONTROLLED TRIAL

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Abstract

Stroke remains one of the leading causes of long-term disability, often resulting in impaired balance, reduced mobility, poor coordination, and increased risk of falls among survivors. This study aimed to compare the effectiveness of balance training exercises and yoga therapy in improving balance and coordination among hemiplegic post-stroke patients. A randomized controlled trial was conducted among 66 post-stroke hemiplegic patients who were randomly allocated into two groups: Group A received balance training exercises, while Group B received yoga therapy. Both groups participated in a structured six-week rehabilitation program consisting of four supervised sessions per week. Balance and functional mobility were assessed using the Berg Balance Scale (BBS) and Timed Up and Go (TUG) test before and after intervention. Data were analyzed using descriptive statistics and Analysis of Covariance (ANCOVA) after assessing residual normality.

The findings demonstrated significant improvements in both intervention groups; however, balance training produced superior outcomes. The adjusted post-intervention BBS mean was higher in the balance training group (51.357) compared with the yoga therapy group (50.098), showing a statistically significant difference ($F=4.117$, $p=0.047$, partial $\eta^2=0.061$). Similarly, the TUG test showed greater improvement in the balance training group, with a lower adjusted mean completion time (8.701 seconds) compared with yoga therapy (10.087 seconds) ($F=37.169$, $p<0.001$, partial $\eta^2=0.371$). These findings indicate that task-specific balance exercises may provide greater improvement in dynamic balance and functional mobility compared with yoga therapy. However, yoga therapy also demonstrated beneficial effects and may serve as a complementary rehabilitation approach.

INTRODUCTION

Stroke is a major neurological disorder associated with significant mortality and disability

worldwide. (Shah, Bachkaniwala, & Chitania, 2024) Survivors frequently experience motor impairments, postural instability, reduced

coordination, and difficulty performing activities of daily living. (Moreno-Segura et al., 2022) Hemiplegia, characterized by weakness or paralysis on one side of the body, is among the most common consequences of stroke and significantly affects functional independence and quality of life. (Du et al., 2025)

Balance impairment following stroke occurs due to altered motor control, sensory deficits, reduced muscle strength, and impaired postural responses. (Zhang et al., 2021) These limitations increase fall risk and restrict community participation. Therefore, effective rehabilitation strategies focusing on balance restoration and mobility improvement are essential for post-stroke recovery. (Zhou et al., 2024)

Exercise-based rehabilitation has become an important component of stroke management. Balance training exercises specifically target postural control, weight shifting, coordination, and functional movement patterns. (Spanakis et al., 2022) Recent evidence indicates that balance-focused interventions can significantly improve balance ability and walking function among stroke survivors. (Yoon & Park, 2023) A 2024 meta-analysis of randomized controlled trials reported significant improvements in Berg Balance Scale scores, trunk control, and ambulation following balance training interventions. [PubMed](#) (Anwar et al., 2021a)

Yoga therapy has also gained attention as a complementary rehabilitation approach due to its combination of physical postures, breathing control, flexibility training, and mind-body awareness. Previous studies have demonstrated improvements in balance, trunk control, and functional outcomes among stroke patients receiving yoga-based interventions. [Medwin Publishers](#) (Shahid et al., 2024)

Although both balance training and yoga therapy have demonstrated positive effects, limited evidence directly compares these two approaches among hemiplegic post-stroke patients. Therefore, this study aimed to compare the effectiveness of balance training exercises and yoga therapy on balance and coordination among post-stroke hemiplegic individuals. (Kuciel et al., 2021)

2. Methodology

Study Design and Participants

A randomized controlled trial design was adopted. The study was conducted at Ibn-e-Sina Hospital and Barki Clinic, Multan, Pakistan. The target population included post-stroke hemiplegic patients. A total of 66 participants were recruited according to predefined inclusion and exclusion criteria. Pasted text

Participants included males and females aged 45–65 years diagnosed with hemiplegic stroke. Individuals with major surgeries, limb amputation, blindness, hearing impairment, or inability to provide consent were excluded. Pasted text

Randomization and Intervention

Participants were randomly assigned through a lottery method into two equal groups:

- **Group A:** Balance Training Exercises (n=33)
- **Group B:** Yoga Therapy (n=33)

Both groups received intervention for six consecutive weeks, with four supervised sessions per week. Each session lasted approximately 45–60 minutes under physiotherapist supervision. Pasted text

The balance training group performed exercises including:

- Single-leg stance
- Wobble board activities
- Tandem walking
- Reaching exercises
- Uneven surface walking

The yoga therapy group performed:

- Mountain pose
- Tree pose
- Back bridge
- Eagle arms
- Half-moon pose

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Outcome Measures

Two standardized assessment tools were used:

1. **Berg Balance Scale (BBS)**
2. Used to assess static and dynamic balance.
3. **Timed Up and Go (TUG) Test**

4.Used to evaluate functional mobility and coordination.
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Statistical Analysis

Data were analyzed using SPSS version 27. Descriptive statistics were calculated, followed by ANCOVA to compare post-intervention differences while controlling baseline scores. Statistical significance was considered at $p < 0.05$.
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3. Results

Table 1. Demographic Characteristics of Participants

Variable	Frequency (n)	Percentage (%)
Total participants	66	100
Male	39	59.1
Female	27	40.9
Hemiplegic stroke	34	51.5
Ischemic stroke	32	48.5

The study included 66 participants with a mean age of 50.05 ± 4.051 years. Male participants

represented a slightly higher proportion compared with females. Pasted text

Table 2. Comparison of Berg Balance Scale Scores Between Groups

Group	Adjusted Mean	Mean Difference	F-value	p-value	Partial η^2
Balance Training	51.357	1.259	4.117	0.047	0.061
Yoga Therapy	50.098	-	-	-	-

The balance training group achieved significantly higher adjusted BBS scores compared with yoga therapy. Pasted text

Table 3. Comparison of Timed Up and Go Scores Between Groups

Group	Adjusted Mean	Mean Difference	F-value	p-value	Partial η^2
Balance Training	8.701	-1.387	37.169	<0.001	0.371
Yoga Therapy	10.087	-	-	-	-

The balance training group demonstrated significantly faster TUG completion time,

indicating better mobility and coordination. Pasted text

4. Discussion

The present study demonstrated that both balance training exercises and yoga therapy improved balance and coordination among hemiplegic post-stroke patients; however, balance training produced significantly greater improvements. (Holley, 2025)

The superior performance of balance training may be explained by its task-specific approach. Exercises such as tandem walking, weight shifting, unstable surface training, and reaching activities

directly challenge the postural control mechanisms required during daily activities. Similar findings were reported by Kim and Yoon (2024), where balance training significantly improved Berg Balance Scale scores and ambulation outcomes among stroke patients. PubMed (Anwar et al., 2021b)

The improvement observed in the yoga therapy group supports previous evidence indicating that yoga can enhance balance, body awareness, flexibility, and trunk control. Recent research has

shown that yoga combined with conventional therapy improves gait, balance, and lower-limb function after stroke. Medwin Publishers (Peng, Zou, & Asakawa, 2025)

However, the current findings suggest that yoga therapy alone may provide slower improvements in dynamic mobility compared with targeted balance exercises. This difference may be because balance training directly stimulates functional activities involving postural adjustments, walking stability, and movement coordination. (Rahman-Enyart, 2022)

Recent systematic reviews also highlight that exercise interventions improve balance outcomes among stroke patients. Zhou et al. (2024) reported that structured exercise programs significantly improve Berg Balance Scale and mobility outcomes. Similarly, Dong et al. (2024) found that mind-body exercises positively influence physical ability and quality of life among stroke survivors. (Han et al., 2025)

The present findings extend previous literature by providing a direct comparison between balance training and yoga therapy, demonstrating that while both approaches are beneficial, balance-specific exercises may provide greater improvements in functional mobility. (Taylor, 2024)

5. Conclusion

This randomized controlled trial concludes that six weeks of balance training exercises significantly improved balance and coordination among hemiplegic post-stroke patients. Although yoga therapy also produced positive changes, balance training demonstrated superior improvements in Berg Balance Scale and Timed Up and Go outcomes. The findings suggest that balance-focused rehabilitation may be prioritized for improving functional mobility and reducing post-stroke balance limitations. Yoga therapy may still serve as a complementary intervention due to its additional physical and psychological benefits.

Limitations

- The study evaluated short-term outcomes without long-term follow-up.

- Stroke severity and previous rehabilitation exposure may have influenced outcomes.
- Only balance and coordination outcomes were assessed.
- The supervised clinical environment may limit generalization to home-based rehabilitation.
- Participants were limited to the 45–65 years age group.

Recommendations

- Future studies should include larger multicenter samples.
- Long-term follow-up should be incorporated to evaluate sustained benefits.
- Combined balance training and yoga therapy protocols should be investigated.
- Additional outcomes such as gait speed, muscle strength, quality of life, and fall confidence should be included.
- Comparative studies involving Pilates, Tai Chi, resistance training, and technology-assisted rehabilitation are recommended.

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