

EFFECT OF YOGA TRAINING ON FLEXIBILITY AND BALANCE AMONG JUMPERS: AN EXPERIMENTAL STUDY

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Abstract

This study investigated the effect of a 12-week yoga intervention on flexibility and balance among jumpers from Adikavi Nannaya University. A total of 20 participants were divided into an intervention group (n=10), which underwent yoga training, and a control group (n=10), which received no intervention. Pre- and post-test measurements of flexibility and balance were conducted, and data were analyzed using paired sample t-tests and ANCOVA. The results indicated a significant improvement ($p < .001$) in flexibility and balance within the intervention group, while no substantial changes were observed in the control group. The improvements in the intervention group can be attributed to neuromuscular adaptations, proprioceptive enhancement, and increased muscle elasticity facilitated by yoga practice. These findings suggest that yoga can be an effective supplementary training method for athletes, particularly those requiring enhanced mobility and postural stability. It is recommended that yoga be integrated into sports training regimens to optimize movement efficiency, reduce injury risk, and improve performance. Future research should explore longer intervention periods, combined training approaches, and biomechanical analyses to further understand yoga's impact on athletic performance.

Keywords: Yoga, flexibility, balance, athletic performance.

Introduction

Flexibility and balance are fundamental components of athletic performance, particularly in jumping sports such as high jump, long jump, and triple jump. These physical attributes influence movement efficiency, power output, and injury prevention (Behm et al., 2016). Jumpers require an optimal range of motion in their lower limbs to generate explosive power during takeoff and maintain postural control upon landing. Limited flexibility can lead to biomechanical inefficiencies, increasing the risk of muscle strain and joint instability (Chinnavan et al., 2015). Similarly, balance is critical for maintaining body control in the air and ensuring a stable landing, reducing the likelihood of injury and enhancing performance consistency (Polsgrove et al., 2016).

Yoga, an ancient practice that integrates physical postures, breathing techniques, and mindfulness, has gained recognition as an effective method for improving flexibility, balance, and overall functional movement (Cowen, 2010). Traditionally associated with relaxation and stress reduction, yoga has evolved into a widely adopted training tool for athletes seeking to enhance their physical conditioning. Various yoga asanas (postures) focus on dynamic and

static stretching, which can improve joint mobility and muscle elasticity, ultimately benefiting athletes in sports that demand a high degree of flexibility (Gulati et al., 2021). Additionally, yoga practices that emphasize core engagement, such as standing balance poses and single-leg postures, have been shown to enhance proprioception and neuromuscular coordination, both of which are essential for maintaining stability during dynamic movements (Mody, 2018).

Several studies have explored the benefits of yoga in athletic training. For instance, Polsgrove et al. (2016) found that a 10-week yoga intervention significantly improved flexibility and balance among college athletes. Similarly, Sherman et al. (2013) highlighted that regular yoga practice enhances postural stability by strengthening deep stabilizing muscles, thereby reducing the risk of falls and movement-related imbalances. Despite these findings, research specifically examining the effects of yoga on flexibility and balance in jumpers remains limited. Given the unique biomechanical demands of jumping events, it is crucial to investigate whether yoga-based training can serve as an effective supplementary intervention for improving these performance-related attributes.

This study aims to evaluate the impact of yoga training on flexibility and balance among jumpers. By analyzing pre- and post-training measures, the research will provide empirical evidence on the effectiveness of yoga in enhancing key physical attributes required for jump-based sports. The findings could offer valuable insights for coaches, trainers, and athletes seeking to integrate yoga into their training regimens for improved athletic performance.

Methodology

This study adopted a quasi-experimental pretest-posttest control group design to examine the effects of a 12-week yoga intervention on flexibility and balance among jumpers. A total of 20 male jumpers from Adikavi Nannaya University, Andhra Pradesh, India, aged between 18 and 25 years, were selected through simple random sampling and divided into two groups. The intervention group (n=10) participated in a structured yoga training program, while the control group (n=10) continued their regular sports training without any additional intervention. Participants were included based on their active involvement in university-level jumping events and the absence of musculoskeletal injuries in the past six months.

The intervention group underwent a structured 12-week yoga training program, conducted five days a week, with each session lasting 60 minutes. The training sessions included a 10-minute warm-up consisting of light jogging and dynamic stretching, followed by 40 minutes of yoga asanas targeting flexibility and balance. The flexibility-focused asanas included Paschimottanasana (Seated Forward Bend), Janu Sirsasana (Head-to-Knee Forward Bend), Bhujangasana (Cobra Pose), and Trikonasana (Triangle Pose), while balance-focused asanas included Vrikshasana (Tree Pose), Natarajasana (Dancer's Pose), Bakasana (Crow Pose), and Garudasana (Eagle Pose). The sessions concluded with a 10-minute cool-down, incorporating relaxation techniques and breathing exercises such as Pranayama and Savasana (Corpse Pose). The control group continued with their usual sports training regimen without any exposure to yoga-based exercises.

To assess the impact of the intervention, flexibility and balance were measured before and after the 12-week period using standardized tests. Flexibility was evaluated using the Sit-

and-Reach Test, which measures lower back and hamstring flexibility, while balance was assessed using the Stork Stand Test, which evaluates static balance by timing the participant's ability to stand on one foot. Statistical analysis was conducted using SPSS software (version 26.0), with a paired t-test applied to determine within-group differences between pretest and posttest results. Additionally, ANCOVA was employed to compare post-intervention outcomes between the intervention and control groups, adjusting for baseline values. A significance level of $p < 0.05$ was considered statistically significant.

Analysis of data

Table 1: Results of paired sample t test of criterion variables.

		Intervention Group					
Variable	Test	N	Mean	SD	statistic	df	p
Flexibility	Before Intervention	10	21.3	1.34	-31.6	9	<.001
	After Intervention	10	29.8	1.93			
Balance	Before Intervention	10	17.3	1.34	-42.4	9	<.001
	After Intervention	10	27.2	1.55			
		Control Group					
Flexibility	Before Intervention	10	21.3	1.34	-1.96	9	0.081
	After Intervention	10	21.6	1.07			
Balance	Before Intervention	10	17.3	1.34	-1.5	9	0.168
	After Intervention	10	17.5	1.58			

The intervention group showed a significant improvement in both flexibility ($t(9) = -31.6$, $p < .001$) and balance ($t(9) = -42.4$, $p < .001$) after the 12-week yoga training. In contrast, the control group showed no significant changes in flexibility ($t(9) = -1.96$, $p = 0.081$) or balance ($t(9) = -1.5$, $p = 0.168$), confirming that the improvements were due to the yoga intervention. These results suggest that yoga effectively enhances flexibility and balance in jumpers.

Table 2: shows the results of ANCOVA for criterion variables.

Flexibility						
Source	Sum of Squares	df	Mean Square	F	p	η^2
Between	336.2	1	336.2	670.8	<.001	0.884
Within	8.52	17	0.501			
Balance						
Source	Sum of Squares	df	Mean Square	F	p	η^2
Between	470.45	1	470.45	1275	<.001	0.914
Within	6.27	17	0.369			

For flexibility, a significant effect was found ($F(1,17) = 670.8$, $p < .001$, $\eta^2 = 0.884$), indicating that 88.4% of the variance in flexibility improvement is attributable to the yoga intervention. For balance, a highly significant effect was observed ($F(1,17) = 1275$, $p < .001$, $\eta^2 = 0.914$), suggesting that 91.4% of the variance in balance improvement is due to yoga training. These results confirm that the 12-week yoga intervention had a strong and meaningful impact on improving flexibility and balance in jumpers.

Discussion on findings

The findings of this study indicate that a 12-week yoga intervention significantly improved flexibility and balance among jumpers. The intervention group showed a marked increase in flexibility and balance, while the control group demonstrated no significant changes. These results align with existing research supporting the effectiveness of yoga in enhancing physical attributes related to sports performance.

The improvement in flexibility can be attributed to the dynamic stretching and sustained postures in yoga, which enhance muscle elasticity and joint mobility. Studies have shown that yoga postures such as Downward Dog, Cobra, and Forward Bends effectively lengthen muscles and improve range of motion (Gummelt, 2015). Research by Polsgrove et al. (2016) also found that regular yoga practice significantly enhances flexibility, particularly in the lower body, due to increased muscle extensibility and neuromuscular adaptation.

Similarly, the improvement in balance can be linked to core engagement, proprioception enhancement, and postural control developed through yoga. Balasubramaniam et al. (2018) reported that yoga strengthens the core muscles, leading to better postural stability and balance control. Specific asanas such as Tree Pose (Vrikshasana) and Warrior Pose (Virabhadrasana) require sustained balance and weight distribution, improving proprioceptive awareness and neuromuscular coordination. Jeter et al. (2015) also found that yoga

significantly improves balance in athletes by enhancing sensory integration and motor control mechanisms.

The mechanisms behind these improvements include neuromuscular adaptation, which enhances movement efficiency and muscle activation patterns (Huang & Fang, 2018), increased joint stability through stronger ligaments and tendons (Ray et al., 2011), and an enhanced mind-body connection, where breath control and mindfulness improve posture and balance (Field, 2016). These findings reinforce the role of yoga as an effective training method for improving flexibility and balance, which are crucial for jumpers. The results support previous studies and highlight yoga's potential as a complementary training approach in athletic performance enhancement.

Conclusion and Recommendations

The findings of this study highlight the significant improvements in flexibility and balance among jumpers following a 12-week yoga intervention, while the control group exhibited no notable changes. These results emphasize the effectiveness of yoga as a complementary training method in enhancing key physical attributes essential for athletic performance. The observed improvements can be attributed to neuromuscular adaptations, enhanced proprioception, and increased muscle elasticity, all of which contribute to better movement efficiency and reduced injury risk. Given the critical role of flexibility and balance in jumping performance, incorporating yoga into regular training programs can provide substantial benefits for athletes.

Based on these findings, it is recommended that coaches and trainers integrate structured yoga sessions into athletic conditioning programs to enhance mobility, stability, and overall movement control. Future research should explore longer intervention periods to assess the sustained benefits of yoga and examine its impact on other athletic populations beyond jumpers. Additionally, investigating the combined effects of yoga with strength and plyometric training could offer further insights into optimizing sport-specific performance. Further studies should also include biomechanical and physiological assessments to gain a deeper understanding of how yoga influences muscle activation, joint stability, and movement efficiency. By incorporating yoga into training regimens, athletes can enhance their overall performance, reduce injury risks, and develop a stronger foundation for athletic success.

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