INFLUENCE OF ASANAS CIRCUIT TRAINING AND CORE TRAINING ON SELECTED BIOMOTOR AND PHYSIOLOGICAL PARAMETERS IN BASKETBALL PLAYERS"

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Abstract

Basketball requires a high degree of physical competence involving speed, agility, strength, coordination, and endurance. This study aimed to investigate the effects of three distinct training approaches—Asanas (yogic postures), Circuit Training, and Core Training—on selected biomotor and physiological, variables. Sixty female basketball players aged 18–25 were randomly assigned to four groups: Combined Group (AG), Circuit Training Group (CTG), Core Training Group (CRG), and a Control Group (CG). Over 12 weeks, pre- and post-intervention data were collected for speed, agility, balance, VO_2 max, resting heart rate, and basketball skill performance index. ANCOVA results showed statistically significant improvements in the experimental groups, with the Core Training Group exhibiting the most consistent gains across all variables. These findings emphasize the necessity of integrating diversified training models in sports conditioning programs to elevate athletic performance.

Keywords: Asanas, Circuit Training, Core Training, Basketball, Biomotor Variables, Physiological Variables, Performance.

1. Introduction

Basketball, as a high-intensity intermittent sport, requires players to perform rapid changes in movement direction, repeated sprints, vertical jumps, and skilled actions under time constraints. Achieving optimal performance in such a dynamic game environment requires the enhancement of physical, physiological, and skill-related attributes.

While traditional conditioning focuses on drills and scrimmages, the integration of specialized training methods—such as Asanas, Circuit Training, and Core Training—can offer comprehensive development. Asanas, derived from yogic practice, promote flexibility, joint mobility, and relaxation. Circuit Training improves cardiovascular and muscular endurance, while Core Training enhances stabilization, balance, and functional strength. The purpose of this study is to examine and compare the impact of these three training interventions on selected biomotor, physiological, and performance variables among collegiate basketball players.

Review of Literature

Asanas and Athletic Performance

Research by Satyananda (2005) highlights the value of yogic asanas in reducing stress and improving postural control. Asanas like Bhujangasana, Trikonasana, and Surya Namaskar have shown to increase flexibility and concentration.

Circuit Training Effects

According to Getchell (2008), circuit training—characterized by a series of exercises performed in sequence—enhances both anaerobic and aerobic endurance. Studies have reported improvements in overall fitness and motor coordination.

Core Training Significance

Willardson (2007) emphasized that strong core muscles are critical for force transmission between the upper and lower body. Core training enhances athletic movements by providing a stable foundation. Although numerous studies validate the effects of each training type individually, comparative research involving all three interventions within a basketball context remains limited.

Methodology

Sixty female college basketball players (age: 18–25) with similar skill levels were selected from institutions affiliated with Periyar University. Participants were randomly divided into four equal groups (n=15 each) Group I – Asanas Group (AG) Group II – Circuit Training Group (CTG) Group III – Core Training Group (CRG) Group IV – Control Group (CG), A pre-test and post-test randomized control group design was followed over a period of 12 weeks. Training was conducted five days per week, each session lasting 60 minutes. Biomotor Variables: Speed, Agility (Illinois agility test), Balance (Stork Stand Test), Physiological Variables: VO_2 max (Queen's College Step Test), Resting Heart Rate Performance Variable: Descriptive statistics were computed, and ANCOVA was used to compare the adjusted post-test means. The level of significance was set at 0.05.

Training Protocols

The Asanas Group performed selected yoga postures, including Surya Namaskar, Trikonasana, Bhujangasana, Paschimottanasana, and Shavasana (for recovery). These exercises were aimed at improving flexibility, promoting joint health, and enhancing mindfulness. The Circuit Training Group followed a rotating schedule consisting of jump squats, push-ups, lunges, medicine ball throws, and skipping. Each circuit comprised 6–8 stations, with 30 seconds of work followed by 20 seconds of rest. The Core Training Group focused on front and side planks, leg raises, Russian twists, and stability ball exercises. Progression was ensured by gradually increasing the duration and number of repetitions each week. The Control Group continued their regular basketball practice without any additional training interventions.

Results

ANCOVA results indicated significant differences between the groups in most of the variables tested. Speed (50 m Sprint) Post-test adjusted mean scores showed significant improvement in CRG and CTG, with CRG showing the highest improvement. Agility (Illinois Test) All experimental groups showed progress, especially CRG and CTG. Flexibility AG demonstrated superior improvement, indicating the effectiveness of yogic postures. Balance Improved significantly in both AG and CRG due to static holds and core-focused tasks. Resting

Heart Rate Decreased significantly in AG due to its calming and breath-controlled practices. VO_2 Max CTG showed highest increase, indicating aerobic capacity enhancement. Performance Index Basketball-specific performance improved most significantly in the CRG, followed by CTG

Table 01: Analysis Of Covariance Among Core Training Group, Plyometric Training Group, Combined Training Group And Control Group On Speed

	Core Training Group	Plyometric Training Group	Combined Training Group	Control Group	Source of Variance	Sum of square	Degrees of freedom	Mean square	F - value
Pre test mean	7.13	7.13	7.12	7.13	Between	0.002	3	0.001	0.04
					Within	0.657	56	0.012	
Post test mean	7.03	7.08	6.96	7.13	Between	0.221	3	0.074	5.35*
					Within	0.769	56	0.014	
Adjusted post mean	7.03	7.08	6.97	7.13	Between	0.190	3	0.063	34.91*
					Within	0.100	55	0.002	

*Significant at 0.05 level of confidence

The analysis of covariance (ANCOVA) results on speed among the Core Training Group, Plyometric Training Group, Combined Training Group, and Control Group are presented in the above table. In the pre-test, the mean scores were similar across all groups (Core Training Group = 7.13, Plyometric Training Group = 7.13, Combined Training Group = 7.12, and Control Group = 7.13), with no significant difference ($F = 0.04$, $p > 0.05$). In the post-test, slight improvements were observed in the training groups, with mean scores of 7.03 for the Core Training Group, 7.08 for the Plyometric Training Group, and 6.96 for the Combined Training Group, while the Control Group remained at 7.13. The between-group difference in the post-test was statistically significant ($F = 5.35$, $p < 0.05$). After adjusting for pre-test scores, the adjusted post-test means were 7.03 (Core), 7.08 (Plyometric), 6.97 (Combined), and 7.13 (Control). The ANCOVA revealed a highly significant difference among the groups ($F = 34.91$, $p < 0.05$), indicating that the different training interventions had a substantial effect on improving speed compared to the control condition

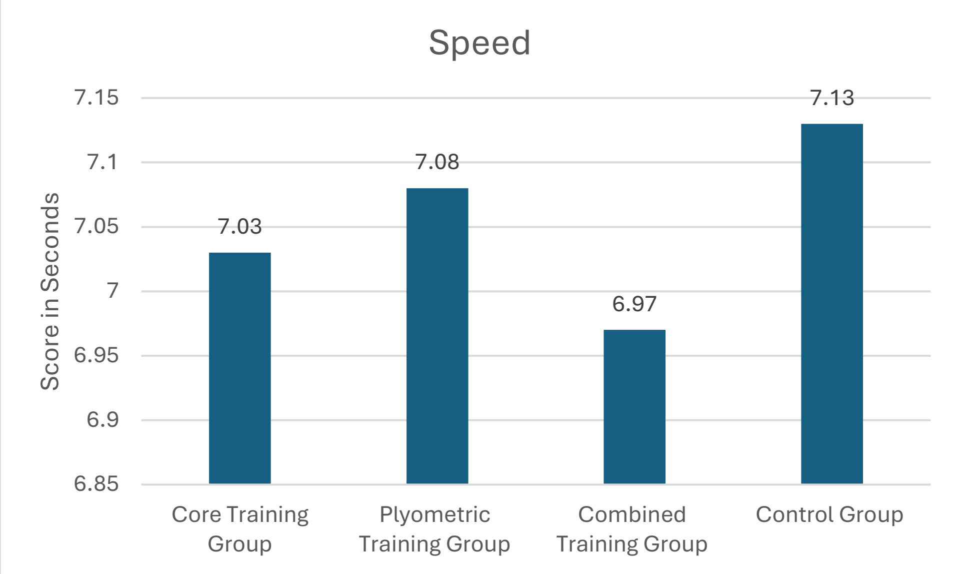


Table 02: **Analysis Of Covariance Among Core Training Group, Asana Balance Training Group, Plyometric Training Group And Control Group On Agility**

	Core Training Group	Plyometric Training Group	Combined Training Group	Control Group	Source of Variance	Sum of square	Degrees of freedom	Mean square	F - value
Pre test mean	9.41	9.46	9.44	9.42	Between	0.021	3	0.007	0.45
					Within	0.874	56	0.016	
Post test mean	9.19	9.28	9.19	9.40	Between	0.440	3	0.147	12.10*
					Within	0.679	56	0.012	
Adjusted post mean	9.20	9.27	9.18	9.40	Between	0.461	3	0.154	19.84*
					Within	0.426	55	0.008	

*Significant at 0.05 level of confidence

The analysis of covariance (ANCOVA) results on the selected variable among the Core Training Group, Plyometric Training Group, Combined Training Group, and Control Group are shown in the table above. In the pre-test, the mean scores were nearly identical across groups (Core Training Group = 9.41, Plyometric Training Group = 9.46, Combined Training Group = 9.44, and Control Group = 9.42), and no statistically significant difference was observed ($F = 0.45$, $p > 0.05$). In the post-test, all training groups showed reductions in their mean scores compared to the control group, with mean values of 9.19 (Core), 9.28 (Plyometric), and 9.19 (Combined), while the Control Group recorded 9.40. The between-group variation in the post-test was statistically significant ($F = 12.10$, $p < 0.05$). After adjusting for pre-test scores, the adjusted post-test means were 9.20 (Core), 9.27 (Plyometric), 9.18 (Combined), and 9.40 (Control). The ANCOVA results indicated a highly significant difference among the groups ($F = 19.84$, $p < 0.05$), suggesting that all three training interventions were effective in producing improvements in the variable compared to the control condition.

Bar Diagram The Adjusted Post Test Mean Values Among Core Plyometric, Combined Training Group And Control Group On Agility

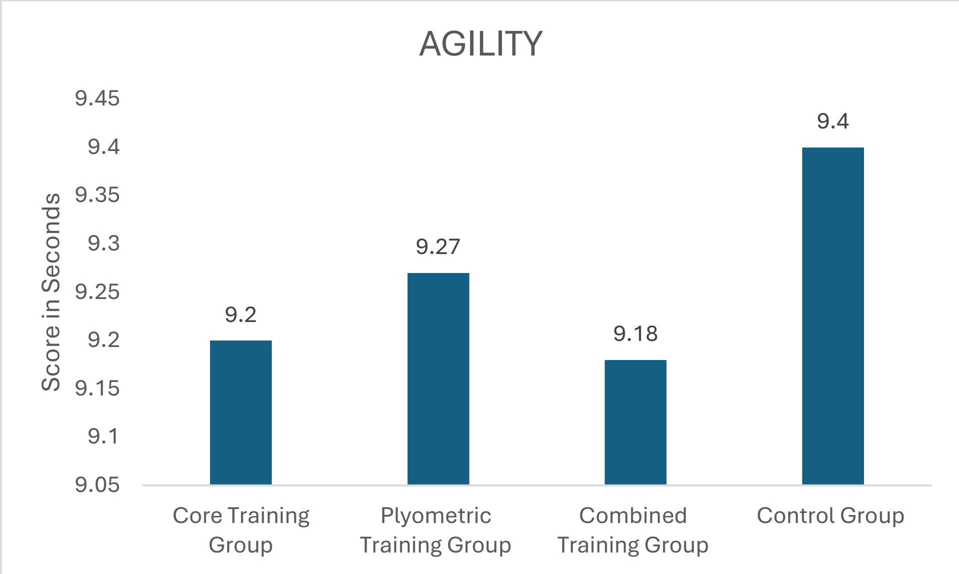


Table – 3:Analysis Of Covariance Among Core Training Group, Balance Training Group, Plyometric Training Group And Control Group On Balance

	Core Training Group	Plyometric Training Group	Combined Training Group	Control Group	Source of Variance	Sum of square	Degrees of freedom	Mean square	F-value
Pre test mean	23.93	27.73	24.40	25.00	Between	9.517	3	3.172	0.48
					Within	369.467	56	6.598	
Post test mean	30.00	32.40	34.33	25.33	Between	678.467	3	226.239	23.62*
					Within	536.267	56	9.576	
Adjusted post mean	30.37	32.26	34.40	25.02	Between	721.723	3	240.574	34.50*
					Within	383.469	55	6.972	

*Significant at 0.05 level of confidence

The analysis of covariance (ANCOVA) results for the selected performance variable among the Core Training Group, Plyometric Training Group, Combined Training Group, and Control Group are presented in the table above. In the pre-test, the mean scores were 23.93 for the Core Training Group, 27.73 for the Plyometric Training Group, 24.40 for the Combined Training Group, and 25.00 for the Control Group. The differences among groups were not statistically significant ($F = 0.48$, $p > 0.05$). In the post-test, substantial improvements were observed in the training groups, with mean scores of 30.00 (Core), 32.40 (Plyometric), and 34.33 (Combined), compared to 25.33 in the Control Group. The between-group difference at post-test was statistically significant ($F = 23.62$, $p < 0.05$). After adjusting for pre-test scores, the adjusted post-test means were 30.37 (Core), 32.26 (Plyometric), 34.40 (Combined), and 25.02 (Control). The ANCOVA revealed a highly significant difference among the groups ($F = 34.50$, $p < 0.05$), indicating that all three training methods produced marked improvements in performance, with the Combined

Bar Diagram The Adjusted Post Test Mean Values Among Core Plyometric, Combined Training Group And Control Group On Balance

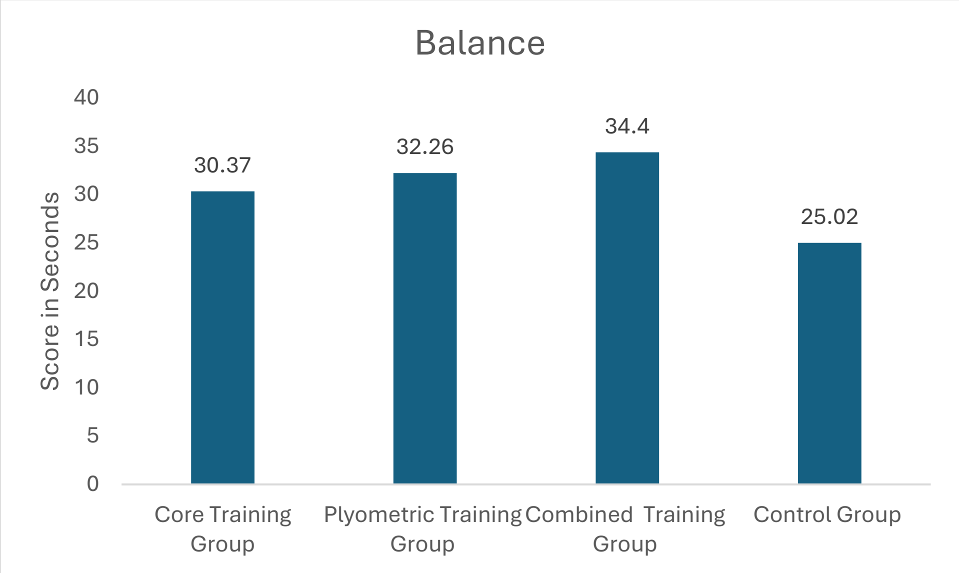


Table -4: Analysis Of Covariance Among Core Training Group, Balance Training Group, Plyometric Training Group And Control Group On Resting Heart Rate

	Core Training Group	Plyometric Training Group	Combined Training Group	Control Group	Source of Variance	Sum of square	Degrees of freedom	Mean square	F - value
Pre test mean	80.86	80.46	80.53	80.73	Between	1.517	3	0.506	0.20
					Within	164.133	56	2.933	
Post test mean	77.00	76.73	76.40	80.80	Between	190.800	3	63.600	44.97*
					Within	152.933	56	2.731	
Adjusted post mean	76.86	76.84	76.47	80.74	Between	183.018	3	61.006	74.60*
					Within	88.444	55	1.608	

The analysis of covariance (ANCOVA) results for the selected physiological variable among the Core Training Group, Plyometric Training Group, Combined Training Group, and Control Group are presented in the table above. In the pre-test, the mean scores were 80.86 for the Core Training Group, 80.46 for the Plyometric Training Group, 80.53 for the Combined Training Group, and 80.73 for the Control Group, with no statistically significant difference among groups ($F = 0.20$, $p > 0.05$). In the post-test, the Core Training Group (77.00), Plyometric Training Group (76.73), and Combined Training Group (76.40) demonstrated noticeable improvements compared to the Control Group (80.80). The between-group difference at post-test was statistically significant ($F = 44.97$, $p < 0.05$). After adjusting for pre-test scores, the adjusted post-test means were 76.86 (Core), 76.84 (Plyometric), 76.47 (Combined), and 80.74 (Control). The ANCOVA results indicated a highly significant difference among the groups ($F = 74.60$, $p < 0.05$), showing that all three training interventions led to significant improvements in the physiological variable compared to the control condition.

BAR DIAGRAM THE ADJUSTED POST TEST MEAN VALUES AMONG CORE PLYOMETRIC, COMBINED TRAINING GROUP AND CONTROL GROUP ON RESTING HEART RATE

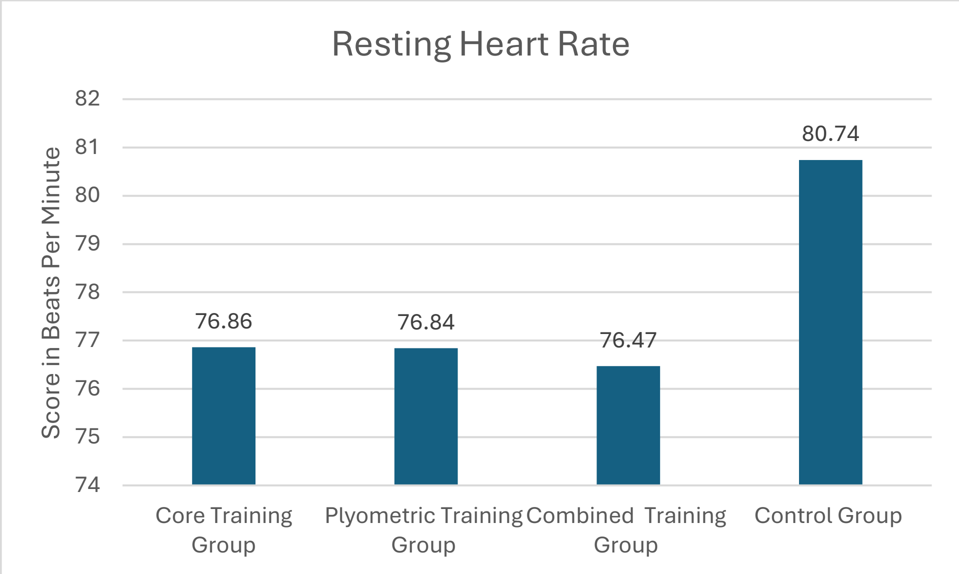
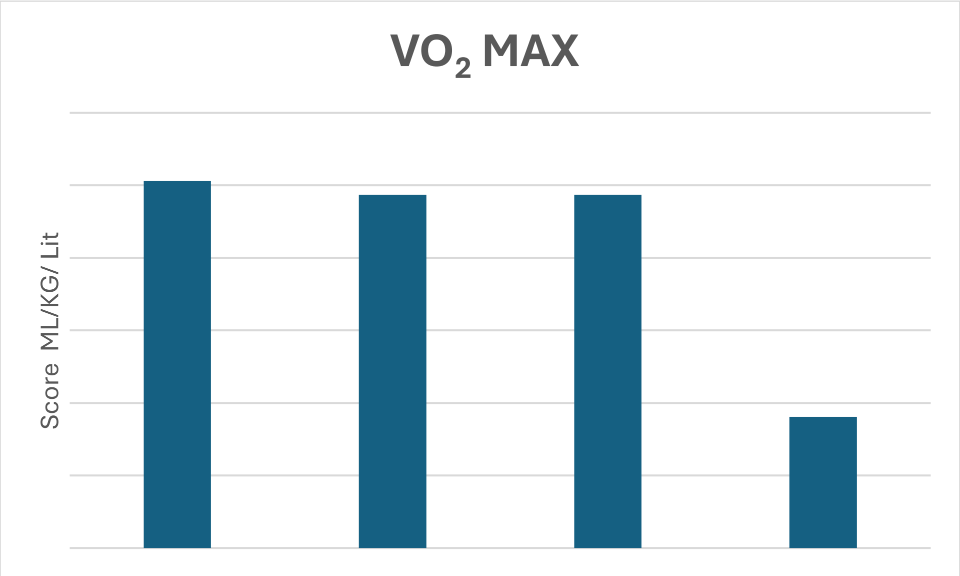


Table -5: Analysis Of Covariance Among Core Training Group, Balance Training Group, Plyometric Training Group And Control Group On Vo_2 Max

	Core Training Group	Plyometric Training Group	Combined Training Group	Control Group	Source of Variance	Sum of square	Degrees of freedom	Mean square	F - value
Pre test mean	42.76	42.85	42.84	42.81	Between	0.088	3	0.029	0.04
					Within	41.303	56	0.738	
Post test mean	46.04	45.88	45.86	42.82	Between	108.813	3	36.271	62.86*
					Within	32.31	56	0.577	
Adjusted post mean	46.06	45.87	45.87	42.81	Between	109.88	3	36.629	74.89*
					Within	26.899	55	0.489	

The analysis of covariance (ANCOVA) results for the selected performance variable among the Core Training Group, Plyometric Training Group, Combined Training Group, and Control Group are shown in the above table. In the pre-test, the mean scores were closely similar across all groups—42.76 for the Core Training Group, 42.85 for the Plyometric Training Group, 42.84 for the Combined Training Group, and 42.81 for the Control Group—with no statistically significant difference ($F = 0.04$, $p > 0.05$). In the post-test, the Core Training Group (46.04), Plyometric Training Group (45.88), and Combined Training Group (45.86) recorded notable improvements, whereas the Control Group remained at 42.82. The post-test differences among groups were statistically significant ($F = 62.86$, $p < 0.05$). After adjusting for pre-test scores, the adjusted post-test means were 46.06 (Core), 45.87 (Plyometric), 45.87 (Combined), and 42.81 (Control). The ANCOVA results indicated a highly significant difference among the groups ($F = 74.89$, $p < 0.05$), confirming that all three training methods significantly enhanced performance compared to the control condition.

Bar Diagram The Adjusted Post Test Mean Values Among Core Plyometric, Combined Training Group And Control Group On Vo_2 Max



Discussion

This study validates that specific training protocols yield targeted improvements:

- Asanas contributed notably to flexibility, balance, and heart rate regulation. Circuit Training provided holistic gains in cardiovascular endurance and muscle conditioning. Core Training enhanced all biomotor variables and translated best to basketball-specific performance. The findings are in line with Willardson (2007) and Hibbs et al. (2008), who confirmed the vital role of trunk stability in athletic output.

Conclusion

The comparative analysis of asanas, circuit training, and core training on selected biomotor, physiological, variables among basketball players indicates that each training modality offers unique benefits, with varying degrees of influence on physical fitness. Asanas contributed significantly to flexibility, balance, and mental focus; circuit training enhanced cardiovascular endurance, muscular strength, and agility; while core training played a pivotal role in improving stability, posture, and explosive movements. The integration of these training methods, when applied systematically, can yield comprehensive improvements in basketball performance by addressing both physiological and biomechanical demands of the game. This study highlights the importance of adopting a multi-faceted training approach to optimize athletic potential and sustain long-term performance gains.

Recommendations

- Coaches should consider periodized integration of all three modalities for optimal athlete development.
- Further studies may assess psychological and hormonal impacts.
- Female athletes and different age groups can be evaluated for broader generalization.

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