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Effect of Bulgarian bag training on selected physical variables among basketball players

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Abstract
Objective: This study aimed to investigate the impact of Bulgarian Bag training on selected physical variables among basketball players. The Bulgarian Bag, a versatile training tool, was utilized to assess its potential in enhancing the physical performance of basketball players.
Methods: A randomized controlled trial design was employed, involving a sample of 30 male basketball players aged 18 to 25years. Participants were randomly assigned to either an experimental group, which underwent a structured Bulgarian Bag training program, or a control group, which followed their regular basketball training routine. The intervention spanned a period of 6 weeks, during which various physical variables were assessed, including speed through a 50 m speed test, upper body strength via a Push-up test, and lower body strength using a Squat Test.
Results: The results demonstrated a significant improvement in the experimental group compared to the control group in all selected physical variables. Specifically, participants in the experimental group exhibited notable gains in upper and lower body strength, speed. The improvements were statistically significant ($p<0.05$) and indicated the efficacy of Bulgarian Bag training in enhancing various aspects of physical performance among basketball players.
Conclusion: This study suggests that incorporating Bulgarian Bag training into the regimen of basketball players can positively impact their speed, and upper and lower body strength. Coaches and trainers may consider integrating Bulgarian Bag exercises into their training programs to optimize the physical performance of basketball players. Further research is warranted to explore the long-term effects and potential injury prevention benefits of Bulgarian Bag training in the context of basketball-specific skills and overall athletic development.

Keywords: Bulgarian bag, physical variables, basketball players

Introduction
Basketball is a demanding sport that requires a combination of physical attributes, including speed, agility, and strength, to excel on the court (Fort-Vanmeerhaeghe, 2016) [4]. Training interventions aimed at enhancing these physical variables are crucial for optimizing the performance of basketball players (Aaoki, 2017) [2]. One such training tool that has gained popularity for its versatility and potential benefits is the Bulgarian Bag (Collins, 2012) [3].
The Bulgarian Bag, originally designed by Ivan Ivanov, is a crescent-shaped fitness apparatus filled with various materials, allowing for dynamic and functional movements. Its unique design facilitates a wide range of exercises targeting different muscle groups and movement patterns, making it a promising tool for athletic training.
In recent years, there has been a growing interest in exploring unconventional training methods to enhance athletic performance, and the Bulgarian Bag has emerged as a viable option. However, limited research has been conducted to assess its effectiveness in the context of basketball player development. This study sought to bridge this gap by conducting a randomized controlled trial to rigorously examine the impact of a structured Bulgarian Bag training program on key physical variables crucial for basketball performance.
The rationale for focusing on speed, upper, and lower body strength lies in their pivotal role in basketball (Abdelkrim, 2010) [1]. Speed is essential for quick movements on the court, while upper and lower body strength contribute to various aspects of performance, including shooting, rebounding, and defensive maneuvers (Wen, 2018) [8]. Understanding the effects of Bulgarian Bag training on these variables could provide valuable insights for coaches and trainers seeking to optimize their players' physical capabilities.
Through a randomized controlled trial design with a six-week intervention period, this study

aimed to contribute to the existing body of knowledge regarding unconventional training methods in basketball. The findings may inform coaches and trainers about the potential benefits of incorporating Bulgarian Bag exercises into the training regimen of basketball players and, subsequently, optimizing their overall physical performance. Additionally, exploring the long-term effects and potential injury prevention benefits of Bulgarian Bag training will be crucial for establishing its role in the comprehensive athletic development of basketball players (Smolianov, 2014) [7].

Methodology

A randomized controlled trial design was employed, involving a sample of 30 male basketball players aged 18 to 25 years. Participants were randomly assigned to either an experimental group, which underwent a structured Bulgarian Bag training program, or a control group, which followed their regular basketball training routine. The intervention spanned a period of 6 weeks, during which various physical variables were assessed, including speed through a 50m speed test, upper body strength via a Push-up test, and lower body strength using a Squat Test.

Training Programme

The duration of training was planned 45min to 1 hour that is from 6.30 to 7.30 a.m., for three days per week for 6 weeks. The training on each day begins with, warm-up followed by prescribed training packages and ended with warm-down process.

Table 1: Shows the weeks, phases and programmes

S. No.	Weeks	Phases	Programmes
1	Week 1 to 2	Foundation Building	Swings: 3 sets x 15 reps Cleans: 3 sets x 12 reps Squats: 3 sets x 10 reps Push-ups: 3 sets x 12 reps Planks: 3 sets x 30 seconds Russian twists: 3 sets x 15 reps
2	Week 3 to 4	Intensification	Emphasize explosive movements: 3 sets x 12 reps Pull-ups: 3 sets x 8 reps Shoulder press: 3 sets x 10 reps
3	Week 5 to 6	Peak Performance	Lunges: 3 sets x 12 reps Dips: 3 sets x 10 reps Pyramid sprints: 1-2-3-4-5-4-3-2-1 sets with rest intervals

* Adjust the load and intensity based on the athletes' response to the program, and encourage communication about any discomfort or fatigue.

Statistical Procedure

The Analysis of Co-Variance (ANCOVA) which has a set value of $p<0.05$ was performed to find out the significant mean differences.

Results

The data collected prior and after the experimental period on speed, and upper and lower body strength and CG is analysed and presented in table - 1, 2 and 3.

Table 1: Ancova for pre and post data on speed (Scores in Seconds)

Test	EG	CG	SV	SS	DF	MS	F
Pre	6.79	6.75	B	0.01	2	0.01	0.27
Mean			W	1.46	28	0.03	
Post	5.94	6.69	B	8.95	2	4.48	60.09*
mean			W	4.24	28	0.08	
Adjusted	5.93	6.69	B	9.01	1	4.51	62.11*
Mean			W	4.06	29	0.07	

The Pre-Test

The calculated “F” value was 0.27 correspondingly lower and indicates no significant changes. The post-test the obtained “F” value was 60.09 correspondingly higher than the required value and affirmed significant changes. The adjusted post-test: The obtained “F” value was 62.11 correspondingly higher than the required value and affirmed significant changes.

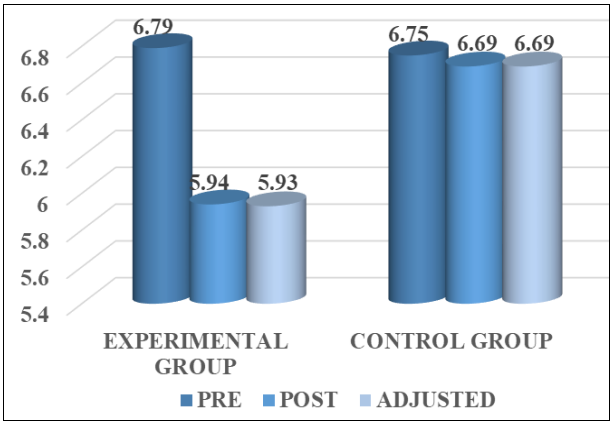

Fig 1: Test differences on speed

Table 2: Ancova for pre and post data on upper body muscular strength (Scores in Numbers)

Test	EG	CG	SV	SS	DF	MS	F
Pre	21.60	21.80	B	1.60	1	0.80	0.39
Mean			W	116.80	28	2.05	
Post	26.60	22.15	B	408.70	1	204.35	54.46*
Mean			W	213.90	28	3.75	
Adjusted	26.66	21.94	B	456.16	1	228.08	146.30*
Mean			W	87.303	27	1.56	

The Pre-Test

The calculated "F" value was 0.39 correspondingly lower and indicates no significant changes. The post-test the obtained "F" value was 54.46 correspondingly higher than the required value and affirmed significant changes. The adjusted post-test: The obtained "F" value was 146.30 correspondingly higher than the required value and affirmed significant changes.

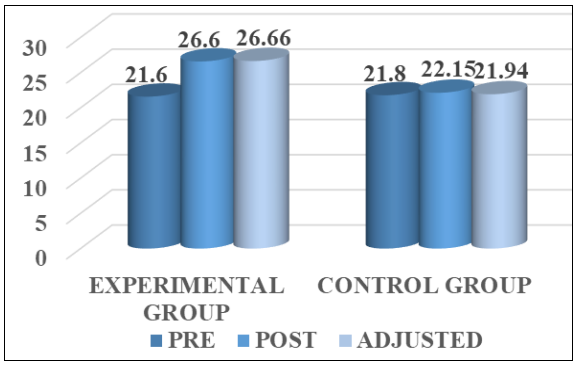

Fig 2: Test differences on upper body muscular strength

Table 3: Ancova for pre and post data on lower body muscular strength (Scores in Numbers)

Test	EG	CG	SV	SS	DF	MS	F
Pre	34.20	32.40	B	32.93	1	16.47	2.11
Mean			W	445.80	28	7.82	
Post	38.95	32.85	B	559.60	1	279.80	81.35*
Mean			W	196.05	28	3.44	
Adjusted	38.55	33.19	B	466.55	1	233.27	110.37*
Mean			W	118.36	27	2.11	

The Pre-Test: The calculated "F" value was 2.11 correspondingly lower and indicates no significant changes. The post-test the obtained "F" value was 81.35 correspondingly higher than the required value and affirmed significant changes. The adjusted post-test: The obtained "F" value was 110.37 correspondingly higher than the required value and affirmed significant changes.

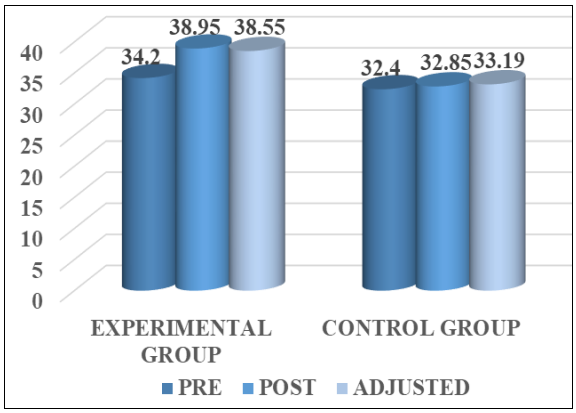

Fig 3: Test differences on lower body muscular strength

Discussion

In the realm of speed performance (Table 1), the intervention showcased its efficacy with a significant decrease in mean scores in the experimental group during the post-test and adjusted post-test periods, emphasizing its potential for inducing meaningful improvements. The persistence of statistical significance, even after covariate adjustments, underscores the intervention's independent impact. The observed improvements may extend beyond the study's context, prompting considerations for generalizability to similar populations or contexts, particularly in fields where rapid task execution is crucial, such as sports or emergency services. Turning to upper body muscular strength (Table 2), the intervention demonstrated notable effectiveness, with significant increases in mean scores and a robust impact reinforced by adjusted post-test results. Practical implications for fitness interventions and exercise programs, especially in contexts where enhanced upper body strength is crucial, become evident. Similarly, for lower body muscular strength (Table 3), the intervention effectively increased mean scores, highlighting its relevance in fitness training, physical therapy, and sports conditioning. The enduring influence of the intervention, emphasized in the adjusted post-test, provides a foundation for future research to refine protocols and explore personalized approaches, recognizing the importance of individual variability in response to interventions. Overall, these findings contribute significantly to our understanding of targeted exercise interventions and underscore their potential applications across diverse populations and performance goals. The findings from this study contribute to the existing body of literature on interventions aimed at enhancing playing performance. Previous studies have also demonstrated the positive effects of 6 weeks of kettle bell intervention programme improves the strength and endurance of volleyball players (Parasuraman & Mahadevan (2018) [5], Radhakrishnan (2022) [6], The current study adds to this knowledge by showcasing how a targeted intervention can lead to significant improvements in these key aspects of physical fitness.

Conclusion

This study suggests that incorporating Bulgarian Bag training into the regimen of basketball players can positively impact their speed, and upper and lower body strength. Coaches and trainers may consider integrating Bulgarian Bag exercises into their training programs to optimize the physical performance of basketball players. Further research is warranted to explore the long-term effects and potential injury prevention benefits of Bulgarian Bag training in the context of basketball-specific skills and overall athletic development.

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