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The effects of Plyometric and Circuit Training on the Body Composition of Madhya Pradesh State Basketball Players

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Abstract - It was hypothesised that there would be a significant difference in the Anthropometric changes brought on by Plyometric and Circuit training for basketball players at the state level of MADHYA PRADESH, therefore that comparison was the study's stated goal. There were just 120 male basketball players from MADHYA PRADESH included in the study. The players' ages varied from 12 to 16. A total of 120 participants were split evenly between the "Experimental Group" and the "Control Group." Pre- and post-six-week training, anthropometric variables were measured with the same instruments. The Experimental group's players trained six days per week, on alternating days (Plyometric Training on Monday, Wednesday and Friday whereas Circuit Training on Tuesday, Thursday, and Saturday). The Anthropometry was analysed to determine a mean and standard deviation. However, compared to the Control Group, the Experimental Group's Anthropometry values were statistically substantially higher.

Keywords - Physical training, basketball, plyometric training, circuit training, anthropometry

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INTRODUCTION

When it comes to sports, nothing is more crucial than becoming in shape. This is because exercise and fitness training improves performance in competitive settings. Various elements affect the player's performance, but physical preparation is the most important. Training refers to the time spent getting ready to do a specific task. When it comes to physical training, "process" is unquestionably as beneficial to players as "result" [1]. All players can benefit from regular physical training, and everyone learns best by doing, by making mistakes and then learning from them, and by placing equal value on the process and the outcome. Extremely significant progress in this direction can be made via training alone.

Training is a crucial process that boosts the physical abilities of a person or a group. Performance in sports and the ability to go about our daily lives with relative ease fall under the umbrella term "physical performance." This demonstrates that player performance is crucial to the success of the organisation and that training and development help players succeed. Players hone their skills through dedicated, goal-oriented training. Training is meant to improve a player's skill and stamina so that they can play at their best. The training process takes a very long time [2]. The athlete develops a tolerance for extreme pressure by repeatedly facing it in practise and competition. A well-thought-out training programme informed by real-world experience is the best way to develop top-notch physical skills.

Conditioning helps in every sport. A frequent expression, "games for the fun of it," describes the enjoyment one experiences when engaging in sports and games for their own sake. One of the most well-liked sports of the present day is basketball. Basketball is the most played sport in the United States, and its popularity is undeniable. Basketball fans on that continent outnumber any others because the level of play is so high and the games are so thrilling. The Y.M.C.A., Physical Directors, Army, Navy, and Air Force personnel were instrumental in bringing this excellent American invention to the rest of the world. Basketball's universal appeal stems from the excitement and fun it provides, which is why fans of all socioeconomic backgrounds go to games and stadiums to watch the sport. Basketball has come a long way from its backyard court roots to become a "world-wide game" that is loved and played all around the globe [3, 4].

Throwing the ball on the ground between two players in the centre used to be the traditional way to start a game. Naismith "invented" basketball on the basis of five tenets: the ball must be played with hands; running with the ball may not be allowed; players of all positions must be able to play the ball; the goal

should be horizontal and above the players; and physical contact is always forbidden. In the early stages, teams often consisted of 40–50 players. This was quickly whittled down to 7 on a side, and then to 5. As the game evolved into its current specialised and popular form, the number of players each side was set at 5. On January 18, 1896, the University of Lowa and the University of Chicago met in a basketball game at Lowa City. Basketball is a sport that requires a wide range of complex abilities, including physical fitness, technical proficiency, team tactics and methods, and a positive mental outlook on one's own performance. High-performance athletes are thought to be able to achieve their results by consistently producing peak levels of strength. Muscular strength, fitness, and body size are, nonetheless, likely to play the most significant roles in a basketball player's success.

Plyometrics, sometimes known as "plyos," is a form of exercise that emphasises the development of explosive power through the repetition of high-velocity, low-load motions found in nature. The term "plyometric" has come to mean "leap" in the context of physical training. It's a form of physical training that aims to raise explosiveness and power in the muscles. Plyometrics are exercises that focus on increasing a player's acceleration, including as hopping, skipping, jumping, and throwing [5]. These can be performed on one leg at a time, both at once, or in an alternating pattern. It's important to remember that a single-leg jump generates nearly twice as much eccentric force as a double-leg jump, and that this force might cause serious injury if the player's muscles aren't ready for it. Following this is a sequence of leaps with varying directions, heights, and obstacles jumped over, as well as items jumped onto and off of. Forcing the player to jump somewhat higher than normal, which leads to greater development, which eventually leads to him being able to jump even higher, makes hopping over things more efficient than regular jumping.

Plyometrics are a great way to be in shape for the rigorous demands of basketball. Repeated bouts of high-intensity activity followed by rest periods that mimic the demands of basketball-specific tasks should be a staple of any good training regimen. Plyometric training is often discussed alongside related terminology like the depth jump, the box jump, and jump training. Plyometrics have long been a part of basketball training programmes as a way to boost explosiveness and quickness. The primary goals of these drills are to improve one's explosiveness and vertical leap. The training loads incorporate a variety of rebounds and rest periods between exercise and drill sessions. Plyometrics are exercises in which athletes undertake explosive movements including stopping, starting, and changing directions in order to increase their agility. Plyometric training is used in many rehabilitation programmes and is regarded as the most common strategy for enhancing performance in team sports. These skills are essential in many team sports, including basketball, because they allow players to perform in-game actions at the proper height, velocity, and time. Plyometric training has been employed by a number of studies, who have shown that it promotes explosiveness and power by conditioning the muscles to perform more work in less time (Adams, et. al.1992; Holcomba, 1996) Although the word "circuit training" is more commonly associated with increasing muscle mass, the same principles that apply to gaining strength may be used to enhance one's basketball skills. During a circuit training session, a player moves between different stations to practise a wide range of skills. Circuit training entails a series of carefully chosen exercises performed in rapid succession. It was originally designed to include anywhere from nine to twelve stations. Participants in circuit training proceed from one exercise station to the next with minimal (15-30 second) or no rest, doing 8-20 repetitions at a resistance of 40%-60% of their One Repetition Maximum in 15-45 second work periods (1RM). Any combination of exercise equipment, free weights, resistance bands, bodyweight exercises, or callisthenics can be used for the Circuit Training workout plan.

An athlete's output can be attributed to a wide variety of causes. It is well-known that size, shape, and form, together with the rest of the body's physical composition, play crucial roles. Skill training, motivation, and other aspects of a physiological and biochemical nature all contribute to an athlete's performance in any given game or event. But basketball has progressed to the point where coaches and players place a premium on physical stature and stamina. The term "anthropometry" refers to the practise of measuring the proportions of a human body, whether the subject is alive or dead. The scientific approach and observations on both the living and the skeleton are provided by anthropometry. In the fields of human biology, physical anthropology, and auxology, anthropometry is the standard and time-honored method of measurement. As of late, it's been inextricably linked to the fields of phys ed and sports sci. [6].

OBJECTIVES

Goal: to determine the impact of plyometric and circuit training on anthropometric variables in a group of male basketball players.

HYPOTHESIS

Plyometric and Circuit Training would not affect anthropometric variables differently in the experimental group compared to the control group.

DELIMITATIONS

- All male basketball players from Madhya Pradesh who competed in the state's Inter District Competition were included in the study.
- Only 120 male basketball players met the inclusion criteria in the study (sixty in Experimental Group and sixty in Control Group).

- Subjects range in age from 12 to 16 years old and are chosen at random.
- Plyometrics and circuit training

For the first six weeks, trainees were only able to commit one hour per week, three days per week, on alternate days.

TRAINING SCHEDULE

We'll do circuit training and plyometrics once a week on alternating days. The plan called for six weeks of plyometric training three times a week (Monday, Wednesday, and Friday) and circuit training three times a week (Tuesday, Thursday, and Saturday). From the start of the training session to the very conclusion, the intensity will grow gradually.

Table 1: Plyometric Training Programme

	Week 1 & Week 2		Week 3		Week 4 & Week 5		Week 6	
	Rep	Sets	Rep	Sets	Rep	Sets	Rep	Sets
Monday								
Jump Squat	15	2	20	2	20	3	20	4
Box Jump	15	2	20	2	20	3	20	4
Side Jump	15	2	20	2	20	3	20	4
Strides	15	2	20	2	20	3	20	4
Skipping	15	2	20	2	20	3	20	4
Wednesday								
Side way box jump	15	2	20	2	20	3	20	4
Tuck Jump	15	2	20	2	20	3	20	4
Sumo Jump	15	2	20	2	20	3	20	4
Hamstring Curl	15	2	20	2	20	3	20	4
Jumping on Toes	15	2	20	2	20	3	20	4
Friday								
One Leg Hop jump	15	2	20	2	20	3	20	4
Box Jump	15	2	20	2	20	3	20	4
Side Way Jump	15	2	20	2	20	3	20	4
Depth Jump	15	2	20	2	20	3	20	4
Scissor Jump	15	2	20	2	20	3	20	4

Table 2: Circuit Training Programme

	Week 1 & Week 2		Week 3 & Week 4		Week 5 & Week 6	
	Duration(sec)	Sets	D (sec)	Sets	D (sec)	Sets
Tuesday, Thursday, Saturday						
Jumping Jacks	20	3	30	3	45	3
Kicking Back	20	3	30	3	45	3
High Knee Strides	20	3	30	3	45	3
Side Hops	20	3	30	3	45	3
Squat	20	3	30	3	45	3
Flutter Kick	20	3	30	3	45	3
Pilates Leg Pulls (up)	20	3	30	3	45	3
Pilates Leg Pulls (down)	20	3	30	3	45	3

METHOD AND PROCEDURE

It's an experimental study. One hundred and twenty male basketball players, all from MADHYA PRADESH, were chosen as the study's sample. Their ages ranged from 12 to 16 years old. These 120 male basketball players were split into two groups of 60 (Experimental Group and Control Group) to study their performance. After warming up and stretching for 15 minutes, the experimental group engaged in an hour of Plyometric and Circuit Training every week for six weeks. The control group did not engage in any supplementary training. The anthropometric data was collected with gold-standard instruments. Each group (experimental and control) would take a pre-test (T1) and another test (T2) after six weeks of training. All of the aforementioned criteria for both the Experimental Group and the Control Group were used to compile the results.

Experimental Variables

The following factors were chosen after reviewing the relevant literature and consulting with professionals in the field:

Dependent Variable

Plyometric and Circuit training were considered as the criterion variable.

Independent Variables

(Anthropometric Variables)

1. Height
2. Weight
3. BMI
4. Upper Leg Length
5. Fore Leg length
6. Thigh Girth
7. Knee Girth
8. Calf Girth

Statistical Techniques/ Inferential Analysis

Examination of basketball players split into a "Experimental" group and a "Control" group, with the latter's pre- and post-test results analysed. We calculated the mean and the standard deviation. The t-test was used for this, and a significance level of 0.05% was chosen to test the hypothesis.

Table 3: Difference of Pre-Test between Experimental and Control Group on Anthropometric variables of MADHYA PRADESH State Basketball Players

	Pre-test	Experimental Group		Control Group		
Sr. No	Variables	Mean	SD	Mean	SD	t-value
1	Height	163.1	7.79	162.58	10.54	0.76
2	Weight	49.63	8.51	51.6	11.48	0.29
3	BMI	18.68	3.04	19.52	4.09	0.21
4	Upper Leg Length	43.07	4.67	42.92	4.81	0.86
5	Fore Leg Length	36.5	2.91	36.03	4.02	0.47
6	Thigh Girth	40.88	5.03	39.93	5.08	0.31
7	Knee Girth	33.6	2.89	32.43	3.36	0.05
8	Calf Girth	31.08	3.37	30.92	3.25	0.79

The pre-test scores of the experimental and control groups of MADHYA PRADESH state basketball players are not significantly different (see Table 3).

Therefore, "There will be no significant difference in pre-test between Experimental and Control Group on Anthropometric variables" is a correct hypothesis to test.

Table 4: Difference of Post-Test between Experimental and Control Group on Anthropometric variables of MADHYA PRADESH State Basketball Players

	Post-test	Experimental Group		Control Group		
Sr. No	Variables	Mean	SD	Mean	SD	t-value
1	Height	166.37	7.66	164.22	10.6	0.21
2	Weight	51.57	7.85	53.92	11.16	0.19
3	BMI	18.67	2.79	20.02	3.99	0.04
4	Upper Leg Length	44	4.78	43.47	4.94	0.55
5	Fore Leg Length	37.42	2.69	36.63	4.03	0.22
6	Thigh Girth	43.6	5.25	41.58	5.03	0.04
7	Knee Girth	35.68	2.98	34.02	3.31	0.01
8	Calf Girth	33.93	3.54	32.4	3.28	0.02

From Table-4, it was inferred that no significant difference exists of post-test between Experimental and Control Group of MADHYA PRADESH State Basketball Players.

For this reason, we adopt the null hypothesis that "There will be no significant difference in post-test between Experimental and Control Group on Anthropometric variables."

Table 5: Difference of Experimental Group between Pre-test and Post-test on Anthropometric variables of MADHYA PRADESH State Basketball Players

	Experimental group	Pre-test		Post-test		
Sr. No	Variables	Mean	SD	Mean	SD	t-value
1	Height	163.1	7.79	166.37	7.66	7.02*
2	Weight	49.63	8.51	51.57	7.85	1.18
3	BMI	18.68	3.04	18.67	2.79	0.87
4	Upper Leg Length	43.07	4.67	44	4.78	3.39*
5	Fore Leg Length	36.5	2.91	37.42	2.69	3.00*
6	Thigh Girth	40.88	5.03	43.6	5.25	6.91*
7	Knee Girth	33.6	2.89	35.68	2.98	6.08*
8	Calf Girth	31.08	3.37	33.93	3.54	2.69*

* Significant at 0.01 level

From Table 5, it was inferred that no significant difference exists of Experimental Group between Pre-test and Post-test of MADHYA PRADESH State Basketball Players.

Since there was a noticeable change in the Experimental Group's height, upper leg length, fore leg length, thigh circumference, knee circumference, and calf circumference after the intervention, we can conclude that the null hypothesis "There will be no significant difference in Experimental Group between pre-test and post-test on Anthropometric variables" was false..

DISCUSSION AND CONCLUSION

From before to after, there was a slight but noticeable increase in the effectiveness of the trainees' Plyometric and Circuit training. MADHYA PRADESH basketball players see improvements in their anthropometric characteristics as a result of plyometric and circuit training.

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