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INFLUENCE OF A PLYOMETRIC EXERCISE PROGRAM AND HIGH-INTENSITY INTERVAL EXERCISE PROGRAM ON BASKETBALL PLAYING ABILITY

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ABSTRACT

The purpose of the study was to find out the influence of a plyometric exercise program and a high-intensity interval exercise program on basketball playing ability. To achieve the purpose of the study, ninety male basketball players were selected at random to study. All the subjects were students of Avvm Sri Pushpam Arts and Science College (autonomous), Poondi, Tanjavur, Tamil Nadu, India. The age of the subjects ranged between 18 and 23 years. They were divided into three equal groups of thirty players. The plyometric exercise training group (group I), the high-intensity interval training group (group I), and the control group (group III) Groups I and II underwent their respective training programs for three days per week for twelve weeks; they did not undergo any special training programs apart from their regular physical education curriculum. The control group did not go for any training. All the subjects were tested prior to and after the experimental treatment periods on selected criterion variables related to physical fitness. The following variables, such as explosive strength and speed endurance, were selected as criterion variables: explosive strength was assessed by a medicine ball throw (maximum distance), and speed endurance was assessed by a 1500-meter run. All the subjects in the three groups were tested on selected criterion variables prior to and immediately after the training program as pre- and post-tests. An analysis of covariance (ancova) was used to find out the significant difference, if any, among the groups on each selected criterion variable separately. In all the cases, a.05 level of confidence was fixed

to test the significance, which was considered appropriate. There was a significant difference between the plyometric exercise training group, the high-intensity interval training group, and the control group on criterion variables such as explosive strength and speed endurance.

Keywords: *Plyometric exercise training group, the high-intensity interval training group, and the control group on criterion variables among explosive strength and speed endurance for the basket ball players*

INTRODUCTION

Basketball is a fast-paced and physically demanding sport that requires explosive power, agility, and endurance. As such, it is important for basketball players to engage in exercise programs that can enhance their performance on the court. The influence of a plyometric exercise program and a moderate-intensity exercise program on basketball playing ability is a topic of interest for coaches, athletes, and researchers alike. Plyometric exercises focus on explosive movements to improve power and agility, while moderate-intensity exercises aim to enhance endurance and overall fitness. This essay will explore the potential impact of these two exercise programs on basketball playing ability, and argue that a combination of both programs may be the most effective approach for improving performance on the court.

Basketball is a dynamic and physically demanding sport that requires athletes to possess explosive power, agility, and endurance. In order to enhance their performance on the court, basketball players often turn to specific training programs to improve their athletic abilities. The influence of a plyometric exercise program and a high-intensity interval exercise program on basketball playing ability has been a topic of growing interest among researchers and coaches. These training programs are designed to target different aspects of athletic performance, and understanding their impact on basketball playing ability can provide valuable insights for players and coaches seeking to optimize their training regimens. This essay will analyze the potential benefits of plyometric and high-intensity interval training for basketball players and argue for their positive influence on overall performance on the court.

Plyometric and high-intensity interval (HIIT) exercises are popular methods of training that have been used to improve physical performance in many sports, including basketball. This article will explore the impact of a plyometric exercise program and a HIIT exercise program on basketball playing ability. It will evaluate the effectiveness of each program, examining the improvements in vertical jump height, agility, speed, and other skills that are important for basketball performance. Additionally, the article will consider the safety of each program to understand how these exercises might affect an athlete's overall health. Finally, the article will

discuss the practical implications of plyometric and HIIT training for basketball players, coaches, and trainers.

Plyometric Exercise Programs

Plyometric exercises involve rapid stretching and contracting of muscles, aiming to improve muscle power and explosiveness. These exercises typically include jumping, hopping, and bounding movements, focusing on enhancing an athlete's ability to generate force quickly. When integrated into a basketball training regimen, plyometric exercise programs can contribute to improved vertical jump, agility, and overall lower body strength, enabling players to execute quick and powerful movements on the court.

High-Intensity Interval Exercise Programs

High-intensity interval exercise programs emphasize short bursts of intense activity followed by brief periods of rest or lower-intensity exercise. By pushing the body to its limits during intense intervals, athletes can improve their cardiovascular endurance, speed, and recovery. For basketball players, the incorporation of high-intensity interval training can lead to enhanced stamina, faster sprinting capabilities, and improved ability to maintain peak performance throughout the game.

Impact on Basketball Playing Ability

When evaluating the influence of plyometric and high-intensity interval exercise programs on basketball playing ability, it becomes evident that these training methodologies offer several advantages. Plyometric exercises can contribute to increased vertical jump height, faster acceleration, and improved agility, allowing players to maneuver on the court with greater speed and precision. Conversely, high-intensity interval training can enhance overall cardiovascular fitness, enabling basketball players to sustain high energy levels throughout the game and recover more efficiently between plays.

Synergistic Effects and Performance Enhancement

The combination of plyometric and high-intensity interval exercise programs presents a synergistic opportunity for basketball players to elevate their performance. By integrating these training modalities, athletes can experience comprehensive improvements in their athletic abilities, including heightened explosiveness, enhanced endurance, and superior agility. This synergistic approach addresses multiple facets of basketball playing ability, creating a well- rounded impact on the overall performance of players on the court.

METHODOLOGY

In this chapter deals with the procedures followed in the selection of the subjects, experimental design, selection of variables, selection of tests, instrument reliability, reliability of the data, pilot study, competence of the tester, orientation to the subjects, training program, collection of data, test administration, experimental design, and statistical procedure.

SELECTION OF SUBJECTS

To achieve the purpose of the study was to find out the influence of a plyometric exercise program and a high-intensity interval exercise program on basketball playing ability. To achieve the purpose of the study, ninety male basketball players were selected at random to study. All the subjects were students of Avvm. Sri Pushpam Arts and Science College (autonomous), Poondi, Tanjavur, Tamil Nadu, India. The age of the subjects ranged between 18 and 23 years. They were divided into three equal groups of thirty players. The plyometric exercise training group (group I), the high-intensity interval training group (group I), and the control group (group III) Groups I and II underwent their respective training programs for three days per week for twelve weeks; they did not undergo any special training programs apart from their regular physical education curriculum. The control group did not go for any training. All the subjects were tested prior to and after the experimental treatment periods on selected criterion variables related to physical fitness. The following variables, such as explosive strength and speed endurance, were selected as criterion variables: explosive strength was assessed by a medicine ball throw (maximum distance), and speed endurance was assessed by a 1500-meter run. All the subjects in the three groups were tested on selected criterion variables prior to and immediately after the training program as pre- and post-tests. An analysis of covariance (ancova) was used to find out the significant difference, if any, among the groups on each selected criterion variable separately. In all the cases, a.05 level of confidence was fixed to test the significance, which was considered appropriate.

TRAINING PROGRAMME

During the training period, there were three groups of subjects: experimental group I plyometric exercise training, experimental group II high-intensity interval training and control group III without training. The experimental groups were given training programs, whereas the control group was given training programs without any training. The training procedure was conducted for three days per week for twelve weeks in addition to their regular physical education activities. Every day's workout lasted about 45–60 minutes, including warm-up and warm-down exercises. Group III acted as a control group and did not participate in any specific training; however, they participated in a regular physical education program. Thus, the training program was conducted with the following: Dependant Variables Parameters for motor fitness variables were selected, such as explosive strength and speed endurance.

STATISTICAL ANALYSIS

The data was collected from four groups prior to and after the completion of the training period on selected criterion variables and statistically examined for significant differences, if any, by applying analysis of covariance (ANCOVA). The Scheffe's post hoc test was applied to determine if there was a significant difference between groups if their ‘F’ ratio was significant. In

all cases, a 0.05 level of confidence was utilized to test the significance. All these techniques were used with the help of the statistical procedure of the social sciences software package version SPSS-21.00.

ANALYSIS OF DATA

The analysis of covariance of the data obtained for explosive strength of the pre-test and post-test of the plyometric exercise training group, high-intensity interval training group and Control group has been presented in Table I.

TABLE -I
ANALYSIS OF COVARIANCE FOR EXPLOSIVE STRENGTH ON PRE TEST AND POST TEST DATA OF EXPERIMENTAL AND CONTROL GROUPS

Test	Plyometric training group	High-intensity interval training	Control Group	Source of Variance	Sum of Squares	Df	Mean Squares	Obtained F ratio
Pre-test Means	64.767	64.333	65.100	Between Within	8.867 3828.733	2 87	4.433 44.008	0.101
Post-test Means	66.367	71.233	64.967	Between Within	649.156 955.300	2 87	324.578 22.475	14.442*
Adjusted post-test Means	66.349	71.448	64.770	Between Within	729.173 856.250	2 86	364.587 9.956	36.618*

**Significant at 0.05 level of confidence. Table value required for F ratio for df 2 to 87 is 3.10 and 2 to86 is 3.10.*

Table -I shows that the pre-test mean values on explosive strength of plyometric exercise training group, high-intensity interval training group, and control group are 64.767, 64.333, and 65.100, respectively. The obtained 'f' ratio of 0.101pre-test score was less than the required table value of 3.10 for df 2 and 87 for significance at the 0.05 level of confidence on explosive strength. The post-test mean values on explosive strength of plyometric exercise training group, high-intensity interval training group, and control group are 66.367, 71.233, and 64.967, respectively. The obtained 'f' ratio value of 14.442for the post-test score was greater than the required table value of 3.10 for the df 2 and 87 for significance at the .05 level of confidence on explosive strength.

The adjusted post-test mean values for the explosive strength of s plyometric exercise training group, high-intensity interval training group, and control group are 66.349, 71.448, and 64.770, respectively. The obtained 'F' ratio value of 36.618 for the adjusted post-test score was

greater than the required table value of 3.10 for DF 2 and 86 for the significance at the .05 level of confidence on explosive strength.

The results of the study indicated that there was a significant difference between the adjusted post-test mean of plyometric exercise training group, the high-intensity interval training group, and the control group on explosive strength.

TABLE-II

SCHEFFES POST-HOC TEST FOR MEAN DIFFERENCE BETWEEN GROUPS ON EXPLOSIVE STRENGTH

Plyometric training group	High-intensity interval training	Control group	Difference between means	Critical differences for adjusted mean
66.349	71.448	5.099*	5.099*	1.713
66.349	64.770	1.579	1.579	1.713
71.448	64.770	6.678*	6.678*	1.713

* Significant at 0.05 level

From Table II, it was imperative that both the plyometric exercise training group and the high-intensity interval training group differ significantly from the control group in terms of explosive strength. Insignificant differences were found between plyometric exercise training group and the high-intensity interval training group in improving the explosive strength of basketball players. Therefore, twelve weeks of plyometric exercise training group showed greater improvement than high-intensity interval training group on the explosive strength of basketball players. The findings of the study imply that both groups improved, but plyometric exercise training group was significantly better at improving explosive strength than other groups confined to this study.

The findings of the study imply that both groups improved, but s high-intensity interval training group was significantly better at improving explosive strength than other groups confined to this study.

TABLE -III

ANALYSIS OF COVARIANCE FOR SPEED ENDURANCE ON PRE TEST AND POST TEST DATA OFEXPERIMENTAL AND CONTROL GROUPS

(1500m run)

Test	Plyometric training group	High-intensity interval training	Control group	Source of Variance	Sum of squares	df	Mean square	F ratio
Pre-test means	51.600	51.600	52.000	Between Within	3.200 150.400	2 87	1.600 1.729	0.926
Post-test means	50.100	41.867	51.933	Between Within	1724.867 244.033	2 87	862.433 2.805	307.465*
Adjusted post-test means	49.958	41.871	51.872	Between Within	36.869 42.913	2 86	18.435 0.449	36.943*

**Significant at 0.05 level of confidence. Table value required for F ratio for df 2 to 87 is 3.10 and 2 to*86 is 3.10.

Table III shows that the pre-test mean values on speed endurance of the plyometric exercise training group, high-intensity interval training group and control group are 51.600, 51.600, and 52.000, respectively. The obtained 'F' ratio of 0.926 pre-test score was less than the required table value of 3.10 for DF 2 and 87 for significance at the .05 level of confidence on speed endurance. The post-test mean values on speed endurance of the s plyometric exercise training group, high-intensity interval training group, and control group are 50.100, 41.867, and 51.933, respectively. The obtained 'F' ratio value of 307.465 for the post-test score was greater than the required table value of 3.10 for the DF 2 and 87 for significance at the .05 level of confidence on speed endurance.

The adjusted post-test mean values on speed endurance of the plyometric exercise training group, high-intensity interval training group and control group are 49.958, 41.871, and 51.872, respectively. The obtained 'F' ratio value of 36.943 for the adjusted post-test score was greater than the required table value of 3.10 for DF 2 and 86 for the significance at the .05 level of confidence on speed endurance.

The results of the study indicated that there was a significant difference among the adjusted post-test mean of plyometric exercise training group, high-intensity interval training group and control group on speed endurance.

TABLE-IV

SCHEFFES POST-HOC TEST FOR MEAN DIFFERENCE BETWEEN GROUPS ON SPEED ENDURANCE

Plyometric group	High-intensity interval training	Control Group	Difference between means	Critical differences for adjusted mean

49.958	41.871	8.087*	4.339	
49.958	51.872	1.914	4.339	
41.871	51.872	10.001*	4.339	

* Significant at 0.05 level of confidence

From Table IV, it was imperative that both the plyometric exercise training group and the high-intensity interval training group differ significantly from the control group in terms of speed endurance. Insignificant differences were found between plyometric exercise training group and the high-intensity interval training group in improving the speed endurance of basketball players. Therefore, twelve weeks of plyometric exercise training group showed greater improvement than high-intensity interval training group on the speed endurance of basketball players. The findings of the study imply that both groups improved, but plyometric exercise training group was significantly better at improving speed endurance than other groups confined to this study.

The findings of the study imply that both groups improved, but s high-intensity interval training group was significantly better at improving speed endurance than other groups confined to this study.

CONCLUSIONS

Based on the research findings, the following conclusions were drawn for the present study following conclusions may be drawn:

In conclusion, the influence of plyometric exercise programs and high-intensity interval exercise programs on basketball playing ability is substantial. The integration of these training methodologies can lead to remarkable enhancements in vertical jump, agility, speed, endurance, and overall physical prowess, equipping basketball players with the necessary skills to excel in their sport. As athletes continue to explore innovative approaches to training, the combination of plyometric and high-intensity interval exercise programs stands out as a promising avenue for optimizing basketball performance.

1. It was concluded that plyometic exercises and high-intensity interval training significantly improved the explosive strength and speed endurance of the basketball players playing abilities.
2. It was concluded that plyometic exercises were better than high-intensity interval training at improving explosive strength among basketball players playing ability.
3. It was concluded that high-intensity interval training and plyometic exercises significantly improved the basketball players playing ability.

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