IJBPAS, February, 2025, 14(2): 1206-1214

ISSN: 2277–4998

International Journal of Biology, Pharmacy and Allied Sciences (IJBPAS)

'A Bridge Between Laboratory and Reader'

www.ijbpas.com

EFFECT OF PLYOMETRIC TRAINING VERSUS RESISTANCE TRAINING ON SPRINT AND AGILITY IN MALE YOUNG ADULT FOOTBALL PLAYERS" – A COMPARATIVE STUDY

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Received 19th Nov. 2023; Revised 18th Dec. 2023; Accepted 12th May 2024; Available online 1st Feb. 2025

https://doi.org/10.31032/IJBPAS/2025/14.2.8760

ABSTRACT

Introduction

Football is a high intensity intermittent sport, so the performance of the players relies on anaerobic energy, speed and power. Plyometric training (PT) consists of dynamic and rapid stretching of muscles, immediately followed by a concentric shortening action of the same muscle and connective tissue. Soccer players need strength to hold off challenges from opponents. Strength training (ST) program should focus on compound, functional exercise.

Methodology

Sample size: 30, Sampling Method: Simple Random Sampling, 2 groups: PT and RT. Outcome Measures- Sprint: 20 m straight line running, Agility: T- drill test for agility. Study Duration- 6 weeks.

Statistical Analysis

Comparison of within group mean differences of agility and sprint is done by using paired t-test. Between group mean difference of agility and sprint are compared using unpaired t- test. P = <0.05.

Results

The agility and sprint performance across baseline and 6 weeks follow up from baseline showed

significant increase in their mean scores within both groups but slightly greater change in score was obtained in PT group among young male adult football players.

Conclusion

The result indicate that PT is slightly more effective than RT in improving agility and sprint performance.

Keywords: Plyometric training, Resistance training, Agility, Sprint, Young adult male football players

INTRODUCTION:

Research results show that RT improves explosive power, speed in football players by affecting the leg extensor muscles **[1, 5, 7, 8]** and benefit sport.

Performance **[4, 9-12]**. Increase in strength and power after RT in adolescents are usually attributed to increased neuromuscular activation. Football is a high intensity intermittent sport, so the performance of the players Coordination hypertrophy **[4]**.

Rather than muscle Relies on anaerobic energy, speed and power **[1]**.

Jumping ability, acceleration and sprinting make important contribution to the performance potential of the soccer players **[6]**.

Plyometric are training techniques used by athletes in all types of sports to increase strength and explosiveness **[2]**. Plyometric training consists of dynamic and rapid stretching of muscles (eccentric action) immediately followed by a concentric shortening action of same muscles and connective tissues **[2, 3]**. In plyometric drills, athletes perform stopping, starting and change in direction in an explosive way, which helps to improve agility **[3]**.

The use of RT by adolescents has attracted increased interest as a means to improve health and performance - related fitness components **[4]**. National Strength and Conditioning Association (NSCA) defines Resistance Training as a specialized form of conditioning involving the progressive use of a wide range of resistive loads and a variety of training modalities designed to enhance health, fitness and sports performance **[4]**.

Miller *et al* (2006) in a study investigated the effect of 6 weeks of plyometric training on young athletes' agility and observed significant improvements **[5, 13]**. Therefore, the purpose of the study was to determine the effects of 6 weeks PT and RT on agility and sprint performance in soccer players **[7]**.

MATERIALS AND METHODOLOGY:

Study Design: Comparative study Sampling method: Simple random Sampling by computerized generated software.

Sample size: 30

Study duration: 6 weeks

Place of study: Fitness center and respective sports club

Inclusion criteria: 18-22 years, Regular football players since 4 years (3-4 times/ week), No ligament injury, Lack of specific diet and medication, Height: 163- 185 cm.

Exclusion criteria: Smokers, Alcoholics, Use of Ergogenic aids, Medications known to affect cardio- respiratory functions during study, participating in any specific fitness program.

Outcome measures:

1) **T – Drill test for agility:** four cones should be set up in the shape of a "T", cone A and B should be set up 10 yards (9.14) apart from each other. Cones B and C should be set up 5 yards (4.57m) apart from each other as well. Cones B and D should be set up 5 yards (4.57m) from each other as well. On getting command of the timer, the subject sprinted to cone B from A, and touched the base of cone with right hand. They then turned left and shuffle sideways to cone C, and also touched its base, this time with their left hand. Then shuffling sideways to the right to cone D, and touching the base with the right hand. They then shuffled back to cone B touched with the left hand, and ran backwards to cone A.
2) **30 – Meter sprint test:** The subject starts from a stationary position and their foot must be on or behind the starting line. The athlete can begin the test as soon as the administrator has set up the time. The test ends when they pass the finishing line.
3) **Group A:** RT (Resisted training) Group B: PT (Plyometric Training)

   Resistance training (RT):

   1) Squats
   2) Leg press
   3) Leg extension
   4) Calf raise
   5) Lunges

   Plyometric training (PT):

   1) Split squat jump
   2) Side hop sprints
   3) Scissor jump
   4) Depth jump
   5) Rim jump

Before the commencement of training during the off- season, the players were informed about the principles of the Plyometrics exercises and Resistance exercises. So, they became familiar with the techniques of exercises to be used in pre-season and also the content of the test procedure.

The correct way to perform the exercise was explained to the subjects at the preparatory meeting before the main test. In addition to regular football training for 6 – weeks, subjects in both groups performed their group's specified exercises 3 times a week for 60 minutes per session. Pre and post data were taken.

For this training there are standardize warm up and cool down protocols are used.

Warm up: For 10 minutes (stretching, jogging and jumping)

Training period: 40 minutes to respective group.

Cool down: For 10 minutes (stretching, jogging and jumping).

RESULT:

To analyse the effect on outcome measure of Agility, T – test for Agility is used before and after the training in Group A and Group B, Paired t- test was used.

To analyse the effect on outcome measure of Sprint, 30-meter Sprint test is used before and after the training in Group A and Group B, Paired t- test was used.

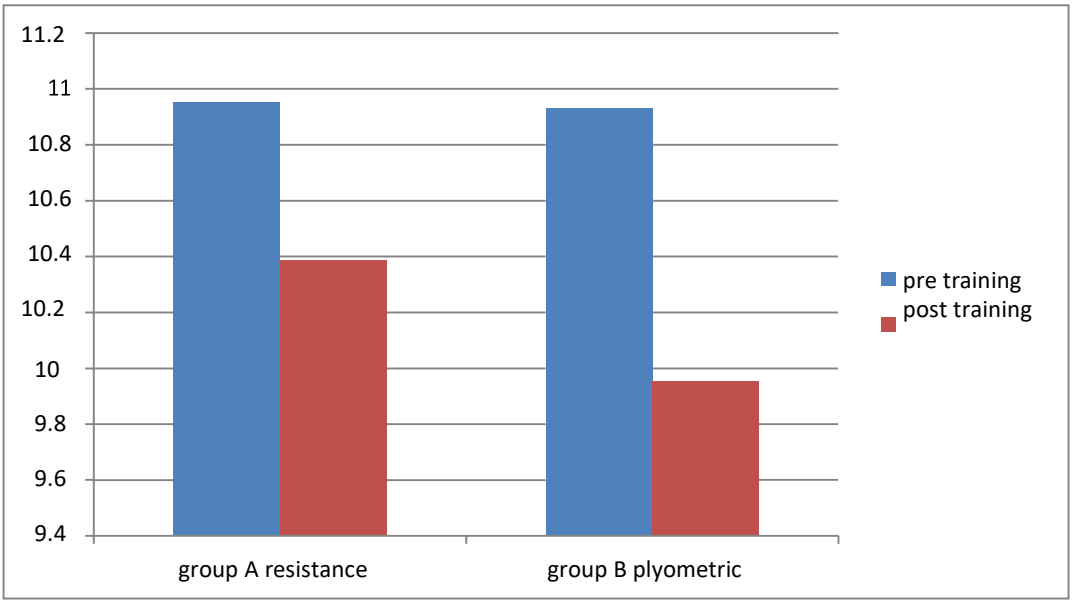
To analyses the effects on the outcome measure – Agility and Sprint between the two groups A and B, independent t-test was used.

Table 1: Resistance Training Program

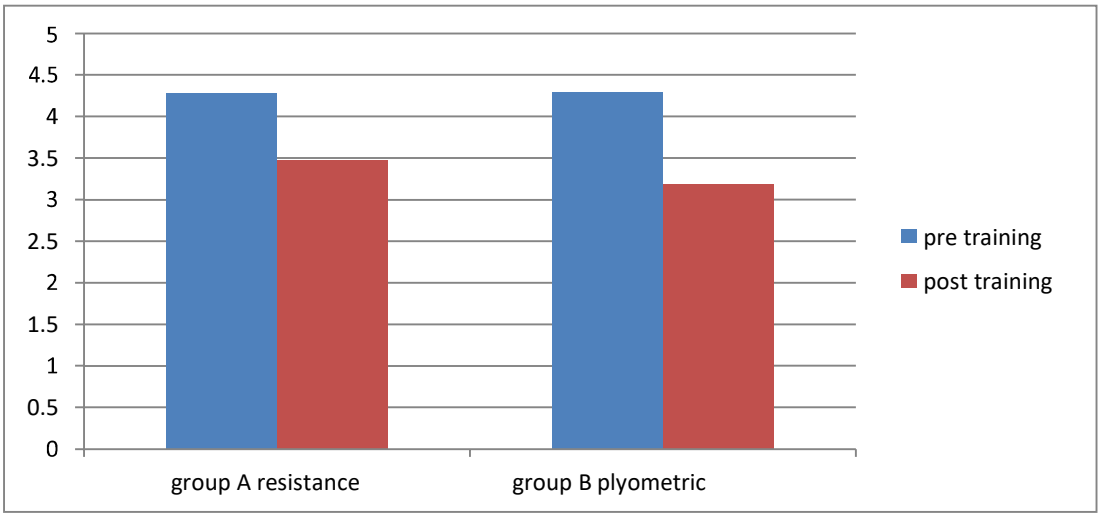
WEEK	CONTENT	REPETITIONS	SETS
WEEK 1		10	2
	Squat Leg press	8-10	2
	Leg extension Calf raise	8-10	2
	Lunges	15-20	2
		10	2
WEEK 2		10	3
	Squat Leg press	8-10	3
	Leg extension Calf raise	8-10	3
	Lunges	15-20	3
		10	3
WEEK 3		20	3
	Squat Leg press	12-15	3
	Leg extension Calf raise	12-15	3
	Lunges	25-30	3
		20	3
WEEK 4		20	4
	Squat Leg press	12-15	4
	Leg extension Calf raise	12-15	4
	Lunges	25-30	4
		20	4
WEEK 5		30	4
	Squat Leg press	17-20	4
	Leg extension Calf raise	17-20	4
	Lunges	35-40	4
		30	4
WEEK 6		30	5
	Squat Leg press	17-20	5
	Leg extension Calf raise	17-20	5
	Lunges	35-40	5
		30	5

Table 2: Plyometri Training Program

WEEK	CONTENT	REPETITIONS	SETS
WEEK 1	Split squat jump Side hop sprints Scissor jump Depth jump Rim jump	10 8-10 8-10 15-20 10	4 2 2 2 4
WEEK 2	Split squat jump Side hop sprints Scissor jump Depth jump Rim jump	3 8-10 4-6 6-8 3	5 3 3 3 5
WEEK 3	Split squat jump Side hop sprints Scissor jump Depth jump Rim jump	6 13-15 8-10 10-12 3-6	5 3 3 3 5
WEEK 4	Split squat jump Side hop sprints Scissor jump Depth jump Rim jump	6 13-15 8-10 10-12 3-6	6 4 4 4 6
WEEK 5	Split squat jump Side hop sprints Scissor jump Depth jump Rim jump	9 18-20 13-15 15-18 9	6 4 4 4 6
WEEK 6	Split squat jump Side hop sprints Scissor jump Depth jump Rim jump	9 18-20 13-15 15-18 9	7 5 5 5 7



Graph 1: Mean difference in Agility in Group A and Group B



Graph 2: Mean difference in Sprint in Group A and Group B

The above analysis shows that group B receiving plyometric training shows more improvement than the group A receiving resistance training.

DISCUSSION:

Soccer is a game which requires very fast body movements which is determined by situations within the competition such as opposing team's player with and without the ball, ball movement and team mate's movement. Because of these reasons, modern soccer game is characterized by fast movements, which become prominent in short and long sprints, explosive reactions (jump) and quick changes of directions [14]. It is generally accepted that high intensity actions such as sprinting or vertical jumping are integral elements for success in soccer and therefore need to be train as a part of periodised youth training programme **[15]**.

We have taken two groups: Group A and B including 15-15 candidates. Group A is receiving resistance training and Group B is receiving plyometric training for 6 weeks. Before and after assessment is done on sprint and agility.

Pauole, K., Madole, K.*et al.,* Done study on reliability and validity of the T- test as the measure of agility, leg power and leg speed in college aged men and women have proved that the T- test produces very reliable results. The reliability of the T-test was 0.98 ross 3 trials **[16]**.

Mackenzie, B. (1999) done study on flying 30meter test. The test is highly reliable as it is conducted strictly an individual's level of motivation to perform the test. The validity of this test provides a means to monitor the effect of training on the athlete's physical development **[12]**.

Maximal strength is an important quality for power performance, because power is the

product of force (strength) and velocity (speed). Thus, an increase in 1 RM is usually related to improved power ability **[13]**. Muscle fibres hypertrophy due to RT led to the subject's ability to change situation and direction rapidly without losing precision and balance. Research results show that RT improves speed in professional soccer players by affecting leg extensor muscles **[14-16]**.

Pretest SD for agility is 0.2662 and posttest SD is 0.3680 also Pretest SD for sprint is 0.07432 and posttest SD is 0.2790 for group A. For group B pretest SD for agility is 0.2944 and posttest SD is 0.2421. Pretest SD for sprint is 0.08319 and posttest SD is 0.03866.

Thus the above result shows that there is slight improvement in resistance training but there is significant improvement in plyometric training. But by comparing, there is significant improvement in Plyometric training than resistance training on both the outcome given for 6 weeks.

Eskander Taheri (2014) studied on "The effect of 8 weeks of plyometric and resistance training on agility, speed and explosive power in soccer players." He concluded that plyometric training had more favorable effects on the study variables compared with resistance exercise. So these training methods are recommended to soccer players and coaches for improving speedy and skilled performances **[14-18]**.

CONCLUSION:

During the course of this study, it has been concluded that – Plyometric training and Resistance training both have improved Sprint and Agility in young adult male football players. There is significant increase in both Plyometric training and Resistance training after 6 week training duration in both groups. But group receiving Plyometric training showed more powerful improvement in Sprint and Agility.

LIMITATIONS:

The study consisted of a small number of subjects. Study duration was small of 6 weeks and no further follow up was taken. Long term effects were not analyzed. Study was done only on young adult male football players.

FUTURE RECOMMENDATIONS:

Future studies should be done on larger sample size in both the groups. The duration of the study should be elongated. Further studies should be done on young adult female football players and for different age group with different sports.

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