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Comparative effect of plyometric exercise and weight training exercise on physical fitness of athletes

Nikhil N. Ratnapure
Research scholar
Sant Gadge Baba Amravati University, Amravati

Dr. Kalyan Maldhure
Supervisor
Research Centre
Takshasheela Mahavidyalaya Amravati
Sant Gadge Baba Amravati University

Abstract:

Purpose this study aimed to evaluate the impact of a six-week plyometric training program on the physical fitness (specifically speed) of male athletes. The primary objective was to provide empirical evidence for coaches and athletes regarding the efficacy of reactive power training compared to traditional methods. Methodology Thirty-six male athletes (average age years) from Amravati University were selected and divided into two equal groups: Control (Group A) and Experimental (Group B). Group B underwent a specialized six-week program featuring lower and upper body plyometric exercises, while Group A received no specific training. Speed was measured via a 100-meter run. Data were analyzed using Mean, Standard Deviation (SD), and Independent's' tests to compare pre- and post-test scores. Results of the study The control group showed no significant improvement ($t = 0.775$, $p > 0.05$). Similarly, while the experimental group showed a mean reduction in sprint time from 8.964 to 8.315 seconds, the intra-group pre/post difference was not statistically significant at0.05 the level (($t = 1.772$). However, a comparative analysis of the post-test results between the two groups revealed a significant difference ($t = 4.404$), which is greater than the tabulated value of 2.021

The findings indicate that plyometric training significantly enhances speed performance compared to no training. The study concludes that plyometric exercises are an effective tool for performance enhancement, offering coaches a scientifically validated method to improve athletic explosive power.

Key word: plyometric exercise, and weight training exercise, physical fitness.

Introduction

The evolution of modern sports science has transformed the landscape of athletic preparation. During the 1960s, researchers introduced several revolutionary training paradigms, including functional training, psycho-physical conditioning, and

Plyometric training. These methods moved beyond simple strength building, focusing instead on the neuromuscular system's ability to generate explosive force. While global Olympic records have been consistently shattered using these techniques, their adoption in the Indian sporting context has been gradual.

The Mechanics of Training

Traditional weight training focuses on physical conditioning through external resistance (barbells and dumbbells) to increase raw force. In contrast, plyometric training utilizes the Stretch-Shortening Cycle (SSC) . This involves a rapid eccentric contraction (muscle lengthening) followed immediately by an explosive concentric contraction (muscle shortening). This "reactive" system trains the body to utilize stored elastic energy, making it essential for speed-based disciplines.

Problem Statement and Objectives

Despite the documented success of plyometric worldwide, many coaches and athletes in local university circuits remain reliant on older methods. This study seeks to bridge that gap by:

Providing athletes with a practical opportunity to experience plyometric benefits.

Assessing the specific impact of these exercises on 100-meter sprint speed.

Equipping coaches with data-driven results to advocate for the inclusion of plyometric in standard training regimens.

Objectives of the study:

1) Provide opportunity to athletes to undergo plyometric training and understand its benefits.
2) Due to this study the sports persons will know which method of training is better in sports.
3) Make coaches aware of the benefits of plyometric exercises training
4) To compare of effect of plyometric training and physical fitness on athletes and know which training method is better for training for performance enhancement of athletes
5) Due to this research study sports coaches will know the benefits of plyometric exercises.

Hypothesis:

It is hypothesized that a systematic six-week plyometric intervention will result in a significant positive improvement in the physical fitness and speed of the participating athletes compared to those following a standard or no-training routine.

Selection of subjects: For this study the scholar select the male athletes who represented Amravati University inter collegiate athletic meet such 36. Athletes the subjects were divided in two groups consisting of 18 subjects eac , based On initial test.in two groups, A would be control group and B group would be experimental group. The scholar will select for the research study. The age of these athletes will be of 19 years to 25 years Average age of athletes will be of 23.5 years.

Selection of plyometric exercises

For plyometric exercises the scholar will select the lower body plyometric exercises and upper body plyometric exercises.

Collection of data:

The Scholar will conduct the physical fitness test prior to initiation of training program of all the selected athletes who will be practicing in plyometric exercises and scores will be collected, from the scores scholar will calculated means and standard deviations of all the 36 athletes who

will be participation in plyometric exercises and tables will be prepared and 't' value will be calculated to see the effect of the plyometric exercise.

Methodology-

The age of these athletes will be of 19 years to 25 years average age of athletes will be of 23.5 years. The athletes will be divided in two equal groups and one group will undergo plyometric exercise training. Pretest data of physical fitness variables will be recorded of both the groups. After completion of six weeks training Physical fitness test will be performed, 100 meter run for speed, the post test data will be collected, and will be compared with pretest data to draw out the conclusion.

Analysis of data and interpretation of the result:

Table No.1

Speed between pre and post test of control group

Control group	Mean	S.D.	S.E. Comb.	M.D.	D.F.	Calculated value t	T.T.
Pre. Test	9.488	1.899	0502	0.389	34	0.775	2.021
Post test	9.877	0.967					

Level of significance 0.05

Tabulated 't' 0.05 (34)=2.02

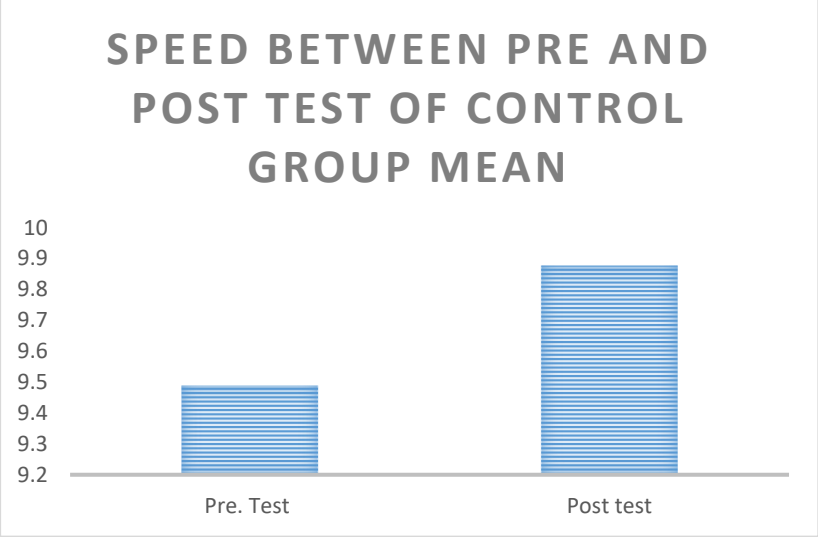


Table number 1 reveals that there is least significant difference between mean of pre and post test of control groups, because mean of pretest is 9.488 is slightly less than mean post is 9.877, and there is mean difference is 0.389. To check the significant difference between pre and Post test of control group of data was again analyzed by the applying 't' test. Before applying' t' test, standard deviation was calculated between pre -test where S.D. is 1.899 and post -test S.D. 0.967 and their combine standard error is 0.502. There was no significant difference between Pre and test of control group because value of calculated' 0.775 which is less than tabulated value is 2. 021 at 0.05 level of confidence, which show no improvement was found in the control group because no training was given to the subject of control group

Table No.2

Speed between pre and post test of experimental group

experimental group	Mean	S.D.	S.E. Comb.	M.D.	D.F.	Calculated value t	T.T.
Pre. Test	8.964	1.042	0.366	0.649	34	1.772	2.021
Post test	8.315	1.153					

Level of significance0.05
Tabulated 't' 0.05 (34)= 2.02

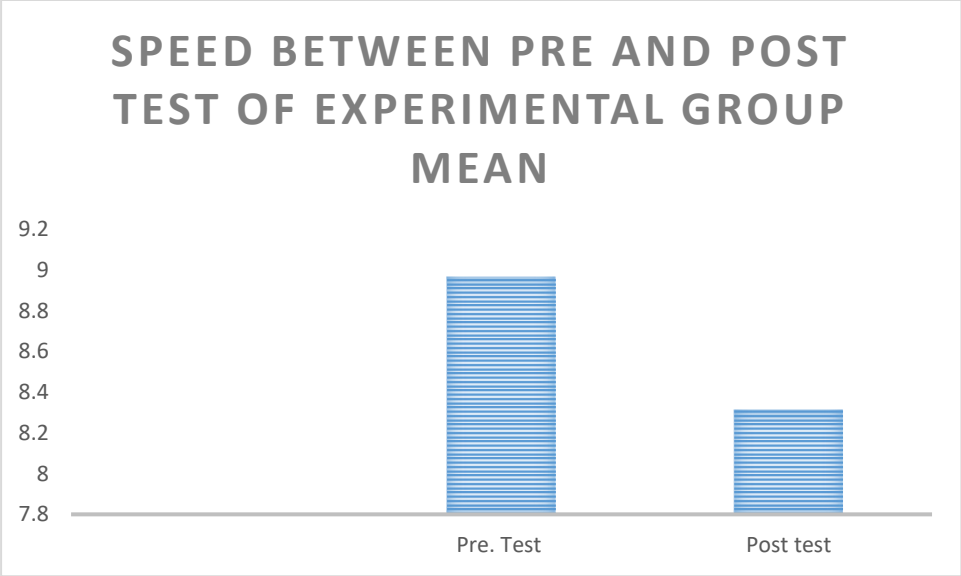


Table number 2 reveals that there is least significant difference between mean of pre and post test of control groups, because mean of pretest is 8.964 is slightly less than mean post is 8.315, and there is mean difference is 0.649. To check the significant difference between pre and Post test of control group of data was again analyzed by the applying 't' test. Before applying ' t' test, standard deviation was calculated between pre -test where S.D. is 1.042and post -test S.D. 1.153 and their combine standard error is 0.366. There was no significant difference between Pre and test of control group because value of calculated' 1.772 which is less than tabulated value is 2. 021 at 0.05 level of confidence, which shows no improvement was found in experimental group after six week plyometric training.

Table No.3

Speed between pre and post test of control and experimental group

group	Mean	S.D.	S.E. Comb.	M.D.	D.F.	Calculated value t	T.T.
Control group	9.877	0.967	0.355	1.562	34	4.404	2.021
experimental group	8.315	1.153					

Level of significance0.05

Tabulated 't' 0.05 (34)= 2.02

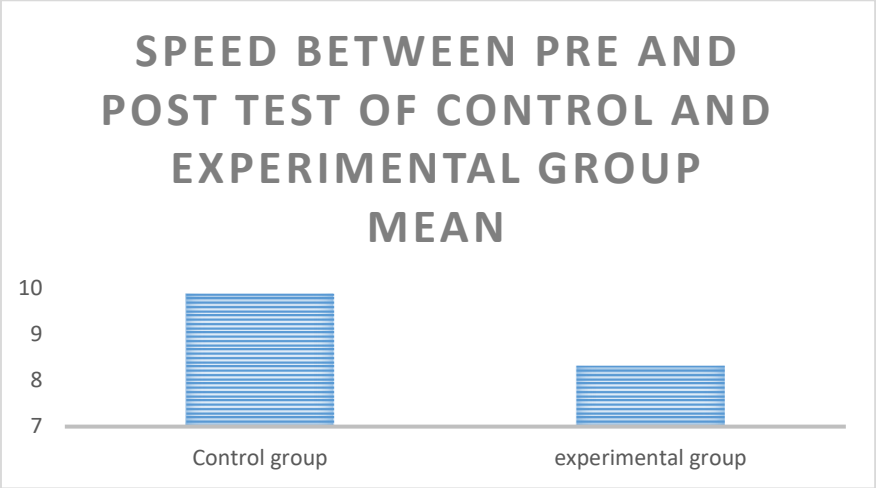


Table number 3 reveals that there is least significant difference between mean Of post taste of control and experimental group because mean of post -test of control group is 9.877 is greater than mean of post- test of experimental group is 8.315 and their mean difference is 1.562 to check the significant difference between post test of control and experimental group the data was again and analyses two applying t test before applying tea test standard deviation was calculated between four stage where is the control group 0.967 and SD of experimental group 1.153 and their combine standard error 0.355 there was significant different between postpaid of control and experimental group because value of calculated 't'4.404 which is greater than tabulated 't' 2.021 at 0.05 level of confidence, which shows improvement was found in experimental group after Six weeks plyometric training

Conclusion:

There was significant Improvements found In speed between post test of control and experiment group. The findings indicate that plyometric training significantly enhances speed performance compared to no training. The study concludes that plyometric exercises are an effective tool for performance enhancement, offering coaches a scientifically validated method to improve athletic explosive power.

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