

Effect of plyometrics exercises on cardio-vascular capacity and playing ability of cricket players

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■ ABSTRACT

Plyometrics (also known as “plyos”) is a type of exercise training designed to produce fast, powerful movements, and improve the functions of the nervous system, generally for the purpose of improving performance in sports. Plyometrics has been shown across the literature to be beneficial to a variety of athletes. Benefits range from injury prevention, power development and sprint performance amongst others. Plyometric exercise involves and uses practicing plyometric movements to enhance tissues abilities and train nerve cells to stimulate a specific pattern of (muscle contraction) so the muscle generates as strong a contraction as possible in the shortest amount of time. Low-intensity variations of plyometrics are frequently utilized in various stages of injury rehabilitation, indicating that the application of proper technique and appropriate safety precautions can make plyometrics safe and effective for most people. Plyometric exercises involve an increased risk of injury due to the large forces generated during training and performance, and should only be performed by well-conditioned individuals who are under supervision. The purpose was to determine the effect of Plyometrics exercises on cardio-vascular capacity and playing ability of inter-collegiate cricket players of Sant Gadge Baba Amravati University, Amravati. The study was delimited to 30 male inter-collegiate players in the age ranging from 18 to 28 years. The players were divided into two equal groups (*i.e.* experimental and control group) on the basis of the mean performance of pre-test score. Two tests were performed on the subjects *i.e.* coopers 12 minute run and walk and three Judges playing ability test. To determine the significant difference t-test was employed and level of significance was set at 0.05 level of confidence. After analysis of data it has been concluded that, there was no significant difference found in vascular endurance and cricket playing ability control group. The significant effect observed in experimental group on cardio-vascular endurance and cricket playing ability, because of training schedule of players. In the post test of control and experimental group significant difference found in cardio-vascular endurance, Off side batting ability, Defend batting ability, Length bowling ability, Full length bowling ability and Overall playing ability. But insignificant in fielding ability.

■ **Key Words** : Plyometric, Endurance, Playing ability

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Plyometrics (also known as “plyos”) is a type of exercise training designed to produce fast, powerful movements, and improve the functions of the nervous system, generally for the purpose of improving performance in sports.

Plyometric movements, in which a muscle is loaded and then contracted in rapid sequence, use the strength, elasticity and innervations of muscle and surrounding tissues to jump higher, run faster, throw farther, or hit harder, depending on

the desired training goal. Plyometrics is used to increase the speed or force of muscular contractions, providing explosiveness for a variety of sport-specific activities. Plyometrics has been shown across the literature to be beneficial to a variety of athletes. Benefits range from injury prevention, power development and sprint performance amongst others.

Plyometric exercise involves and uses practicing plyometric movements to enhance tissues abilities and train nerve cells to stimulate a specific pattern of (muscle contraction) so the muscle generates as strong a contraction as possible in the shortest amount of time. A plyometric contraction involves first a rapid muscle lengthening movement (eccentric phase), followed by a short resting phase (amortization phase), then an explosive muscle shortening movement (concentric phase), which enables muscles to work together in doing the particular motion. Plyometric exercise engages the myotatic reflex, which is the automatic contraction of muscles when their stretch sensory receptors are stimulated.

Plyometrics are not inherently dangerous, but the highly focused, intense movements used in repetition increase the potential level of stress on joints and musculo-tendonous units. Therefore, safety precautions are a strong prerequisite to this particular method of exercise. Low-intensity variations of plyometrics are frequently utilized in various stages of injury rehabilitation, indicating that the application of proper technique and appropriate safety precautions can make plyometrics safe and effective for most people.

Plyometrics have been shown to have benefits for reducing lower-extremity injuries in team sports while combined with other neuromuscular training (*i.e.* strength training, balance training, and stretching). Plyometric exercises involve an increased risk of injury due to the large forces generated during training and performance, and should only be performed by well-conditioned individuals who are under supervision. Good levels of physical strength, flexibility, and proprioception should be achieved before commencement of plyometric training.

Purpose of the study :

The main purpose of the present study was to determine the effect of Plyometrics exercises on cardio-vascular capacity and playing ability of inter-collegiate cricket players.

■ METHODOLOGY

For the present study the data was collected from inter-collegiate cricket players of Sant Gadge Baba Amravati University, Amravati. The study was delimited to 30 male inter-collegiate players. Age of the players was ranging from 18 to 28 years. The researcher divided the cricket players into two equal groups on the basis of the mean performance

of pre-test score. The groups were equated and distributed into two homogeneous groups namely.

- Experimental group and
- Control group.

Selection of tests :

- Cardio-vascular capacity : coopers 12 minute run and walk
- Three Judges playing ability test.

■ OBSERVATIONS AND DISCUSSION

To determine the significant difference in the means of Cardio-vascular capacity and playing ability of cricket players between the two groups as well as between the pre-test and post test means of experimental and control group t-test was employed.

Level of significance :

To find out the significance difference, level of significance was set at 0.05 level of confidence.

Findings of the statistical analysis have been shown in the following tables.

From the Table 1 shows that, cardio-vascular capacity mean difference between the pre-test and post-test of control group is not significant, because the calculated t-value of 0.120 is less than the tabulated t-value of 2.144 at 0.05 level of confidence of 14 degree of freedom.

Table 1 : Summary of mean, standard deviation and t-ratio for the data on Cardio-vascular capacity between the means of pre and post-tests of control group

Test	Mean	S.D.	M.D.	S.E.	t-ratio
Pre-test	2188	78.098	3.00	24.878	0.120*
Post-test	2191	57.140			

* indicate of significance of value at P=0.05, Tabulated t 0.05(14) = 2.144

Table 2 reveals that, mean difference of Off Side Batting Ability calculated t-value of 0.807 and Defend Batting Ability calculated t-value of 0.748 between the Pre-test and Post-test of control group is not significant, because the calculated t-value was less than the tabulated t-value of 2.144 at 0.05 level of confidence of 14 degree of freedom.

Table 2 : Summary of mean, standard deviation and t-ratio for the data on playing ability in batting of cricketers between the means of pre and post-tests of control group

Batting	Test	Mean	S.D.	M.D.	S.E.	t-ratio
Off side	Pre-test	4.000	1.069	0.267	0.330	0.807*
	Post-test	4.267	0.704			

* indicate of significance of value at P=0.05, Tabulated t0.05(14) = 2.144

Table 3 reveals that, mean difference of Good Length Bowling Ability calculated t-value of 0.464 and Full Length Bowling Ability calculated t-value of 0.354 between the Pre-

Table 3 : Summary of mean, standard deviation and t-ratio for the data on playing ability in bowling of cricketers between the means of pre and post-tests of control group

Bowling	Test	Mean	S.D.	M.D.	S.E.	t-ratio
Good length	Pre-test	4.533	1.407	0.200	0.431	0.464*
	Post-test	4.333	0.900			
Full length	Pre-test	3.933	1.033	0.134	0.377	0.354*
	Post-test	4.067	1.033			

* indicate of significance of value at P=0.05, Tabulated t(0.05(14)) = 2.144

test and Post-test of Control group is not significant, because the calculated t-value was less than the tabulated t-value of 2.144 at 0.05 level of confidence of 14 degree of freedom.

Table 4 shows that, Fielding Ability mean difference between the pre-test and post-test of control group is not significant, because the calculated t-value of 0.209 is less than the tabulated t-value of 2.144 at 0.05 level of confidence of 14 degree of freedom.

Table 4 : Summary of mean, standard deviation and t-ratio for the data on fielding ability between the means of pre and post-tests of control group

Test	Mean	S.D.	M.D.	S.E.	t-ratio
Pre-test	4.533	0.834	0.067	0.319	0.209*

* indicate of significance of value at P=0.05, Tabulated t(0.05 (14)) = 2.144

Table 5 shows that, playing ability mean difference between the pre-test and post-test of control group is not significant, because the calculated t-value of 0.738 is less than the tabulated t-value of 2.144 at 0.05 level of confidence of 14 degree of freedom.

Table 5 : Summary of mean, standard deviation and t-ratio for the data on playing ability of cricketer between the means of pre and post-tests of control group

Test	Mean	S.D.	M.D.	S.E.	t-ratio
Pre-test	20.467	1.807	0.533	0.723	0.738*
Post-test	21.000	2.138			

* indicate of significance of value at P=0.05, Tabulated t(0.05(14)) = 2.144

Table 6 shows that, Cardio-vascular endurance mean difference between the pre-test and post-test of experimental group is significant, because the calculated t-value of 2.172 is greater than the tabulated t-value of 2.144 at 0.05 level of confidence of 14 degree of freedom.

Table 7 reveals that, mean difference of off side batting ability calculated t-value of 4.299 and defend batting ability

Table 6 : Summary of mean, standard deviation and t-ratio for the data on Cardio-vascular endurance between the means of pre and post-tests of experimental group

Test	Mean	S.D.	M.D.	S.E.	t-ratio
Pre-test	2178	89.878	70.00	32.538	2.172@
Post-test	2248	88.331			

* indicate of significance of value at P=0.05, Tabulated t(0.05(14)) = 2.144

calculated t-value of 3.930 between the Pre-test and Post-test of experimental group is significant, because the calculated t-value are greater than the tabulated t-value of 2.144 at 0.05 level of confidence of 14 degree of freedom.

Table 7 : Summary of mean, standard deviation and t-ratio for the data on playing ability in batting of Cricketers between the means of pre and post-tests of experimental group

Batting	Test	Mean	S.D.	M.D.	S.E.	t-ratio
Off Side	Pre-test	3.667	0.976	1.400	0.326	4.299*
	Post-test	5.067	0.799			
Defend	Pre-test	4.467	0.743	1.066	0.271	3.930*
	Post-test	5.533	0.743			

* indicate of significance of value at P=0.05, Tabulated t(0.05(14)) = 2.144

Table 8 reveals that, mean difference of good length bowling ability calculated t-value of 3.371 and full length bowling ability calculated t-value of 2.567 between the pre-test and post-test of experimental group is significant, because the calculated t-values are greater than the tabulated t-value of 2.144 at 0.05 level of confidence of 14 degree of freedom.

Table 8 : Summary of mean, standard deviation and t-ratio for the data on playing ability in bowling of Cricketers between the means of pre and post-tests of experimental group

Bowling	Test	Mean	S.D.	M.D.	S.E.	t-ratio
Good Length	Pre-test	4.200	1.014	1.133	0.336	3.371*
	Post-test	5.333	0.816			
Full Length	Pre-test	4.067	1.100	1.000	0.390	2.567*
	Post-test	5.067	1.033			

* indicate of significance of value at P=0.05, Tabulated t(0.05(14)) = 2.144

Table 9 shows that, fielding ability mean difference between the pre-test and post-test of experimental group is significant, because the calculated t-value of 2.347 is greater than the tabulated t-value of 2.144 at 0.05 level of confidence of 14 degree of freedom.

Table 9 : Summary of mean, standard deviation and t-ratio for the data on fielding ability between the means of pre and post-tests of experimental group

Test	Mean	S.D.	M.D.	S.E.	t-ratio
Pre-test	4.200	1.014	0.800	0.341	2.347*
Post-test	5.333	0.845			

* indicate of significance of value at P=0.05, Tabulated t(0.05(14)) = 2.144

Table 10 shows that, playing ability mean difference between the pre-test and post-test of experimental group is significant, because the calculated t-value of 7.407 is much greater than the tabulated t-value of 2.144 at 0.05 level of confidence of 14 degree of freedom.

Table 11 shows that, Cardio-vascular Endurance mean difference between the post-test of control and experimental groups is significant, because the calculated t-value of 2.111 is greater than the tabulated t-value of 2.048 at 0.05 level of



confidence of 28 degree of freedom.

Table 10 : Summary of mean, standard deviation and t-ratio for the data on playing ability of cricketer between the means of pre and post-tests of experimental group

Test	Mean	S.D.	M.D.	S.E.	t-ratio
Pre-test	20.600	1.682	5.400	0.729	7.407*
Post-test	26.000	2.268			

* indicate of significance of value at P=0.05, Tabulated t(0.05)(14) = 2.144

Table 11 : Summary of mean, standard deviation and t-ratio for the data on cardio-vascular endurance between the means of post-tests of control and experimental groups

Group	Mean	S.D.	M.D.	S.E.	t-ratio
Control	2191	57.140	57.00	27.163	2.111*
Experimental	2248	88.331			

* indicate of significance of value at P=0.05, Tabulated t(0.05)(14) = 2.048

Table 12 reveals that, mean difference of Off Side batting ability calculated t-value of 2.910 and defend batting ability calculated t-value of 5.738 between the post-test of control and experimental groups are significant, because the calculated t-value are greater than the tabulated t-value of 2.048 at 0.05 level of confidence of 28 degree of freedom.

Table 12 : Summary of mean, standard deviation and t-ratio for the data on playing ability in batting of cricketers between the means of pre and post-tests of experimental group

Batting	Group	Mean	S.D.	M.D.	S.E.	t-ratio
Off	Control	4.267	0.704	0.800	0.275	2.910*
Side	Experimental	5.067	0.799			
Defend	Control	3.733	0.961	1.800	0.314	5.738*
	Experimental	5.533	0.743			

* indicate of significance of value at P=0.05, Tabulated t(0.05)(14) = 2.048

Table 13 reveals that, mean difference of good length bowling ability calculated t-value of 3.188 and full length bowling ability calculated t-value of 2.652 between the Post-test of control and experimental groups are significant, because the calculated t-values are greater than the tabulated t-value of 2.048 at 0.05 level of confidence of 28 degree of freedom.

Table 13 : Summary of mean, standard deviation and t-ratio for the data on playing ability in bowling of cricketers between the means of post-tests of control and experimental groups

Bowling	Test	Mean	S.D.	M.D.	S.E.	t-ratio
Good	Control	4.333	0.900	1.000	0.314	3.188*
Length	Experimental	5.333	0.816			
Full	Control	4.067	1.033	1.000	0.377	2.652*
Length	Experimental	5.067	1.033			

* indicate of significance of value at P=0.05, Tabulated t(0.05)(14) = 2.048

Table 14 shows that, fielding ability mean difference between the Post-test of control and experimental groups was

not significant, because the calculated t-value of 1.247 is less than the tabulated t-value of 2.048 at 0.05 level of confidence of 28 degree of freedom.

Table 14 : Summary of mean, standard deviation and t-ratio for the data on fielding ability between the means of post-tests of control and experimental groups

Group	Mean	S.D.	M.D.	S.E.	t-ratio
Control	4.600	0.910	0.400	0.321	1.247@
Experimental	5.000	0.845			

* indicate of significance of value at P=0.05, Tabulated t(0.05)(14) = 2.048

Table 15 shows that, playing ability mean difference between the post-test of control and experimental group is significant, because the calculated t-value of 6.213 is much greater than the tabulated t-value of 2.048 at 0.05 level of confidence of 28 degree of freedom.

Table 15 : Summary of mean, standard deviation and t-ratio for the data on playing ability of cricketer between the means of post-tests of control and experimental groups

Group	Mean	S.D.	M.D.	S.E.	t-ratio
Control	21.000	2.138	5.000	0.805	6.213*
Experimental	26.000	2.268			

* indicate of significance of value at P=0.05, Tabulated t(0.05)(14) = 2.048

After the statistical analysis pre-test and post-test of control group was not significant, in Cardio-vascular Endurance (t = 0.120), Off Side Batting Ability (t = 0.807), Defend Batting Ability (t = 0.784) and Length Bowling Ability (t = 0.464), Full Length Bowling Ability (t = 0.354), Fielding Ability (t = 0.209) and Overall playing Ability (t = 0.738), because these t-values are less than the tabulated t-value of 2.144 at 0.05 level of confidence of 14 degree of freedom.

After the statistical Analysis pre-test and post-test of Experimental group was not significant, in Cardio-vascular Endurance (t = 2.172), Off Side Batting Ability (t = 4.299), Defend Batting Ability (t = 3.930) and Length Bowling Ability (t = 3.371), Full Length Bowling Ability (t = 2.567), Fielding Ability (t = 2.347) and Overall playing Ability (t = 7.407), because these t-values are less than the tabulated t-value of 2.144 at 0.05 level of confidence of 14 degree of freedom.

Also significant difference found between Post test of control and experimental groups in Cardio-vascular Endurance (t = 2.111), Off Side Batting Ability (t = 2.910), Defend Batting Ability (t = 5.738) and Good Length Bowling Ability (t = 3.188), Full Length Bowling Ability (t = 2.652), and Overall playing Ability (t = 6.213), because these t-values are less than the tabulated t-value of 2.048 at 0.05 level of confidence of 28 degree of freedom.

It is also observed that insignificant difference in fielding ability (t = 1.247) which was less than tabulated t-

value of 2.048 at 0.05 level of confidence of 28 degree of freedom.

Conclusion :

From the above findings following are the conclusion the drawn :

- There was no significant difference found in vascular endurance and cricket playing ability control group.
- The significant effect observed in experimental group on cardio-vascular endurance and cricket playing ability, because of training schedule of players.
- In the post test of control and experimental group significant difference found in cardio-vascular endurance, off side batting ability, defend batting ability, length bowling ability, full length bowling ability and overall playing ability. But insignificant in fielding ability.

Recommendation :

Researcher given some recommendations is as below : Similar study may be conducted on girls players.

- If the training schedule increase may given the positive result on fielding ability.
- Similar study may be conducted on different level

of players *i.e.* district, state, national etc.

- For the better and reliable result number of subjects may be increase.
- Similar study may be conducted on different age groups of players.
- Similar study may be conducted on the other games players.

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