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EFFECT OF TWELVE-WEEK PLYOMETRIC TRAINING ON SELECTED PHYSIOLOGICAL AND SKILL RELATED PERFORMANCE VARIABLES OF MALE MEDIUM FAST BOWLERS IN CRICKET

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Abstract

Cricket is one of the world's major team sports in terms of regular international games. Bowling action is a highly skilled activity acquired over years of fine tuning. The presence of an imbalance between the agonist and antagonist muscle groups and physiological factors is one of the major risk factors for developing in high skilled bowlers. Plyometric training prevented upper as well as lower extremity injuries due to. The purpose of this study was to find out the effect of Twelve-week plyometric training on physiological and skill related performance variables of university level male medium fast bowlers in cricket. The significant improvement observes in bowling velocities, throwing distance, Resting Heart Rate, Vital Capacity, Systolic Blood Pressure (Sig. 2-tailed - .000, .002, .001, .035, .008 respectively) and also improve was found but not significance in Diastolic Blood Pressure, Body Fat percentage (Sig. 2-tailed - .510, .060). It is concluded that Twelve-week plyometric training increases the physiological and skill related performance variables hence improves their performance.

Key words: plyometric training, physiological variables, skill related performance etc.

INTRODUCTION

Cricket is one of the top team sports in the world in terms of regular international matches. It is a bat and ball sport similar to the game of baseball, usually played outdoors on natural grass fields. Explosive bowling action; whereby a large amount of force must be generated in a very short period of time. medium Fast bowlers have always been identified as the type of cricket with the highest risk of injury. Dinshaw N Pardiwala et.al mentioned in their study that Bowling (41.3%), fielding, and wicket keeping (28.6%) account for most injuries.

Medium Fast bowling is a highly skilled activity, one acquired through years of fine-tuning. Also from a neuromuscular perspective, medium Fast bowling is a complex activity, and optimal performance is the result of highly regulated intramuscular and intramuscular coordination, regulated by the central nervous system. Many researchers have found that modern training techniques, and especially strength training, have been implicated as a major contributing factor to recent injuries across the globe.

Karppine has shown that the basic principles of plyometrics state that shortening cycles, when applied correctly, will facilitate maximum power in minimal time. '12-week' plyometric training is designed to improve throwing and jumping efficiency in cricketers, strengthening the rotator cuff and lower extremity muscles to prevent shoulder injuries from overhead throwing and concussion lower extremity injury from jumping.

MATERIALS AND METHODS

Subjects

The experimental study design to 10 university level male medium fast bowler aged 19 to 27 years, were randomly selected from Guru Ghasidas Vishwavidyalaya and Atal Bihari Vajpayee Vishwavidyalaya for the twelve weeks plyometric program.

Procedure

The participants were put through a 5 min warm-up session. This brief warm-up comprised of 2 min jogging, 3 min of stretching. Students were then asked to bowl 3 consecutive deliveries with full intensity to and maximum velocity. In skill performance the bowling speeds were measured using the Bushnell Radar Gun, in Km/h. By Pressing the button beneath the Bushnell Velocity's LCD display panel to turn

the machine on. Best of the three ball was recorded as score and throwing distance were measures manually by throwing the SG Club ball from starting line to towards the open and target ground. Measurement was taken in meter by measuring tape. In physiological variables Blood pressure (Systolic and Diastolic) was taken through standard Digital BP monitor, Vital Capacity was measured through Spirometry test, Body Fat Percentage was measured through Omron Body Fat Analyzer and Resting Heart Rate measures manually. Then, the Twelve-week plyometric training, done 3 days a week, was given to the bowlers, beside their regular practice session. Following 12 weeks of training, post-readings for the bowling velocity, throwing distance and physiological parameters, identical to that described in the pretesting protocol, were obtained and documented.

Training protocol included:

Sl. No.	Plyometric Exercises
1	Tuck jump
2	Power skipping
3	Lunge jump
4	Clapping push-ups
5	Wheelbarrow
6	Bounding
7	Lateral hop over cone
8	Wall push-ups

Statistical analysis

For analysis the collected data Pared "t" test was used through SPSS software, version 26.0.

RESULTS

Bowling velocity

Table 1

Paired Samples Statistics				
	Mean	N	Std. Deviation	Std. Error Mean
Bowling Speed Pre-test	107.2000	10	3.25918	1.03064
Bowling Speed Post-test	108.7000	10	2.86938	.90738

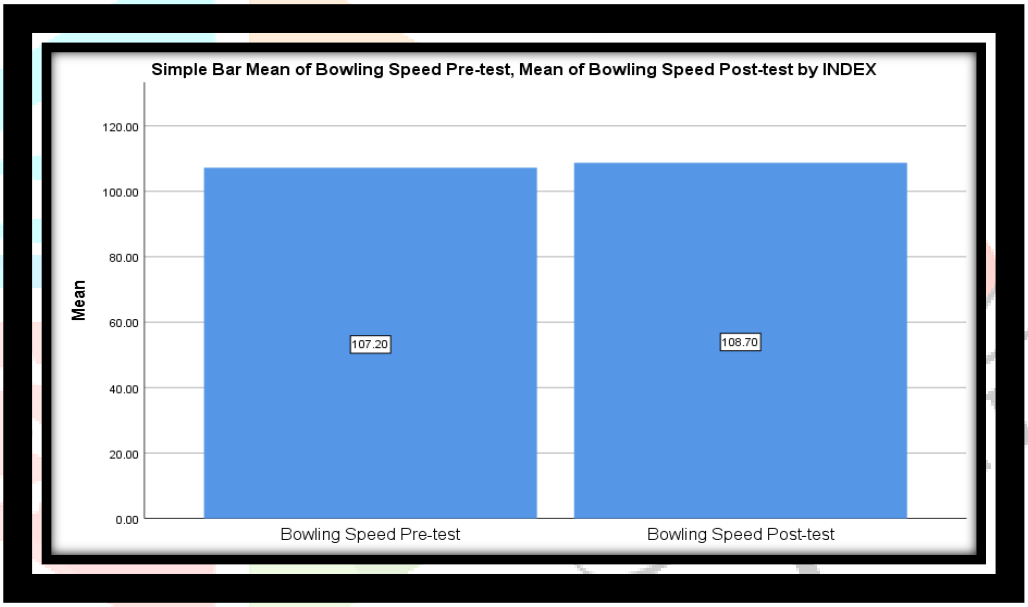
Table 1 shows that the descriptive statistics of the Bowling velocity. The result of the paired sample statistics shows that after getting the plyometric training the subjects perform better (pre-test mean-107.200 & post-test mean 108.700).

Table 1.1

Paired Samples Test						
	Paired Differences			t	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean			
Bowling Speed Pre-test - Post-test	1.50000	.52705	.16667	9.000	9	.000

Table 2 shows paired sample "t" test. Where the result shows that there was significance difference were found (sig. 2-tailed .000). comparing both pre-test and post-test mean of the bowling velocity shows the difference was 1.500. So, we can conclude that due to the plyometric training bowling velocity was increased.

Figure 1



Throwing Distance

Table 2

Paired Samples Statistics				
	Mean	N	Std. Deviation	Std. Error Mean
Throwing distance Pre-test	64.2000	10	6.12463	1.93678
Throwing distance Post-test	67.6000	10	3.94968	1.24900

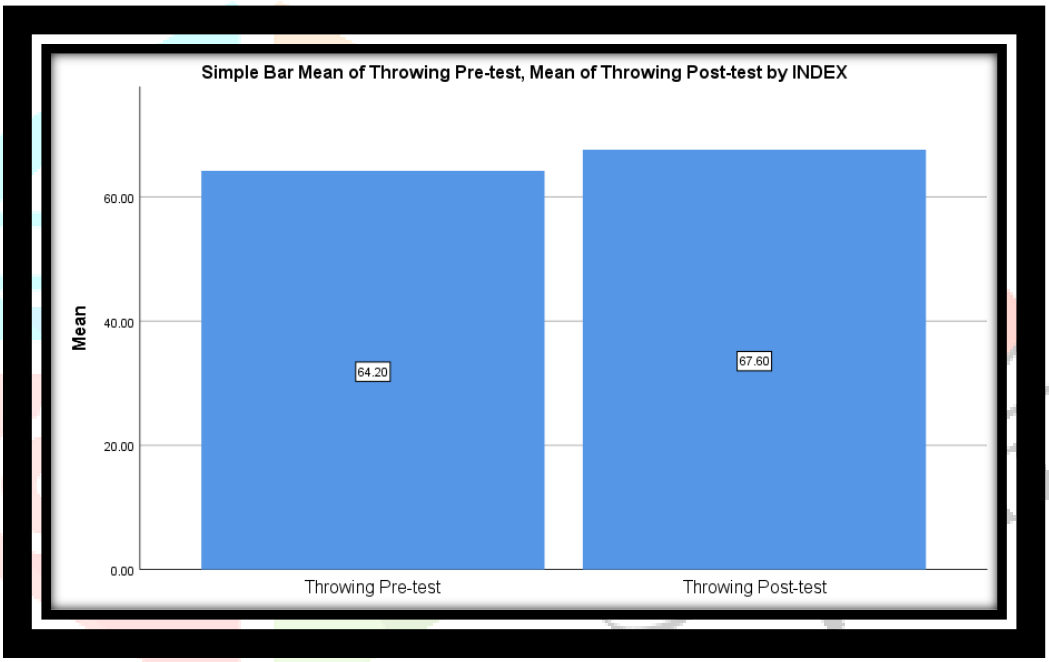
Table 2 shows that the descriptive statistics of the Throwing distance. The result of the paired sample statistics shows that after getting the plyometric training the subjects perform better (pre-test mean-64.2000 & post-test mean 67.6000).

Table 2.1

Paired Samples Test						
	Paired Differences			t	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean			
Throwing distance Pre-test - Post-test	3.40000	2.50333	.79162	4.295	9	.002

Table 2.1 shows paired sample "t" test of Throwing distance. Where the result shows that there was significance difference were found (sig. 2-tailed .002). comparing both pre-test and post-test mean of the Throwing distance shows the difference was 3.40000. So, we can conclude that due to the plyometric training Throwing distance was increased.

Figure 2



Resting Heart Rate

Table 3

Paired Samples Statistics				
	Mean	N	Std. Deviation	Std. Error Mean
Resting Heart Rate Pre-test	73.8000	10	6.66333	2.10713
Resting Heart Rate Post-test	72.2000	10	5.95912	1.88444

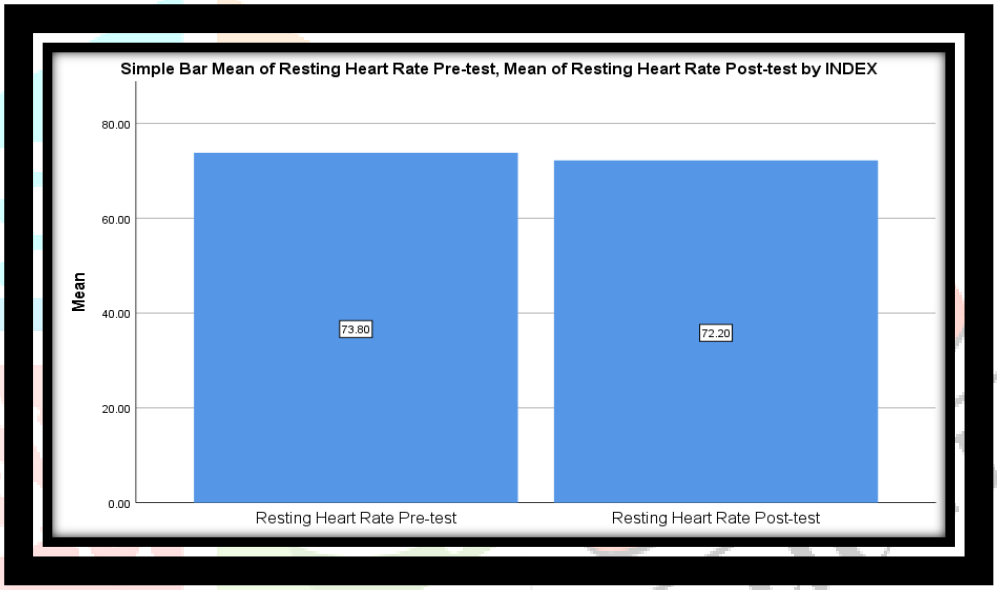
Table 3 shows that the descriptive statistics of the Resting Heart Rate. The result of the paired sample statistics shows that after getting the plyometric training the subjects resting heart rate perform better (pre-test mean-73.8000& post-test mean 72.2000) and subjects resting heart rate was reduced.

Table 3.1

Paired Samples Test						
	Paired Differences			t	Df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean			
Resting Heart Rate Pre-test - Post-test	1.6000	1.07497	.33993	4.707	9	.001

Table 3.1 shows paired sample "t" test of Resting Heart Rate. Where the result shows that there was significance difference were found (sig. 2-tailed .001). comparing both pre-test and post-test mean of the Resting Heart Rate shows the mean difference was 1.60000. So, we can conclude that due to the plyometric training Resting Heart Rate was reduced.

Figure 3



Body Fat Percentage

Table 4

Paired Samples Statistics				
	Mean	N	Std. Deviation	Std. Error Mean
Body Fat percentage Pre-test	25.1400	10	3.96994	1.25541
Body Fat percentage Post-test	24.7400	10	3.46865	1.09688

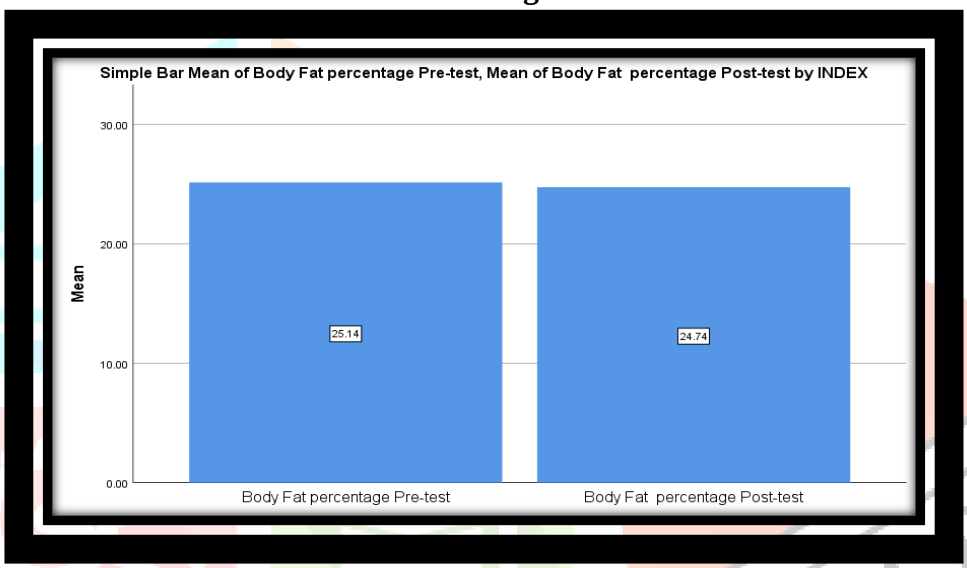
Table 4 shows that the descriptive statistics of the Body Fat percentage. The result of the paired sample statistics shows that after getting the plyometric training the subjects Body Fat percentage perform better (pre-test mean-25.1400 & post-test mean 24.7400) and subjects Body Fat percentage was reduced.

Table 4.1

Paired Samples Test						
	Paired Differences			t	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean			
Body Fat percentage Pre-test - Post-test	.4000	.58878	.18619	2.148	9	.060

Table 4.1 shows paired sample "t" test of Body Fat percentage. Where the result shows that there was significance difference were not found (sig. 2-tailed .060). comparing both pre-test and post-test mean of the Body Fat percentage shows the mean difference was .40000. So, we can conclude that due to the plyometric training the Body Fat percentage can be improve but not that much.

Figure 4



Vital Capacity

Table 5

Paired Samples Statistics				
	Mean	N	Std. Deviation	Std. Error Mean
Vital Capacity Pre-test	4.2250	10	.19873	.06284
Vital Capacity Post-test	4.2760	10	.16188	.05119

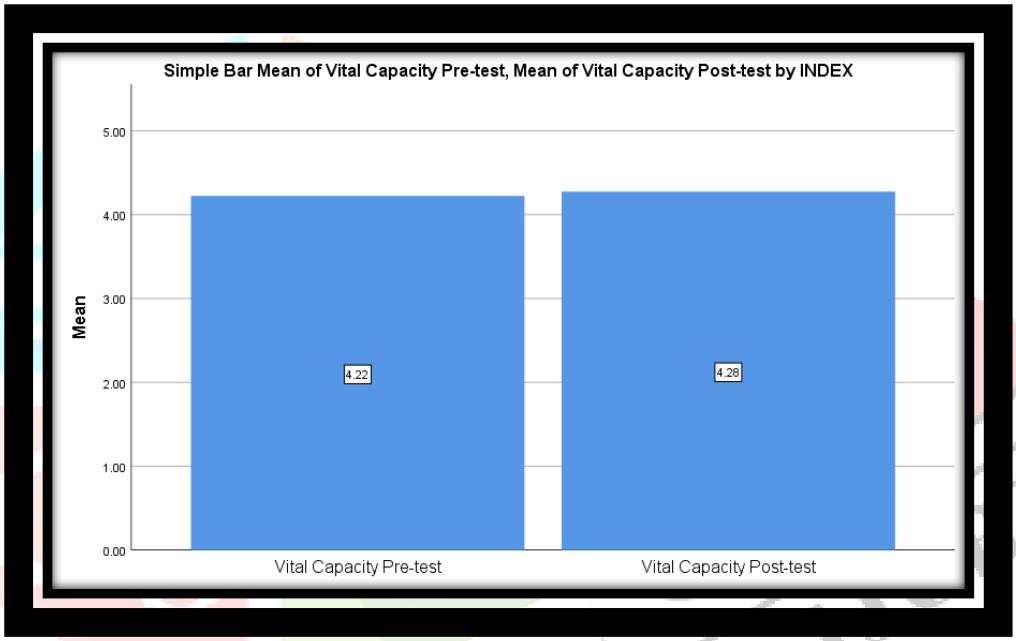
Table 5 shows that the descriptive statistics of the Vital Capacity. The result of the paired sample statistics shows that after getting the plyometric training the subjects Vital Capacity perform slightly better (pre-test mean - 4.2250 & post-test mean - 4.2760) and subjects Vital Capacity was reduced.

Table 5.1

Paired Samples Test						
	Paired Differences			t	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean			
Vital Capacity Pre-test - Post-test	.05100	.06488	.02052	2.486	9	.035

Table 5.1 shows paired sample "t" test of Vital Capacity. Where the result shows that there was significance difference were found (sig. 2-tailed .035). comparing both pre-test and post-test mean of the Vital Capacity shows the mean difference was -.05100. So, we can conclude that due to the plyometric training the Vital Capacity can be improve but not that much.

Figure 5



Systolic Blood Pressure

Table 6

Paired Samples Statistics				
	Mean	N	Std. Deviation	Std. Error Mean
Systolic Blood Pressure Pre-test	131.3000	10	6.68414	2.11371
Systolic Blood Pressure Post-test	127.6000	10	4.64758	1.46969

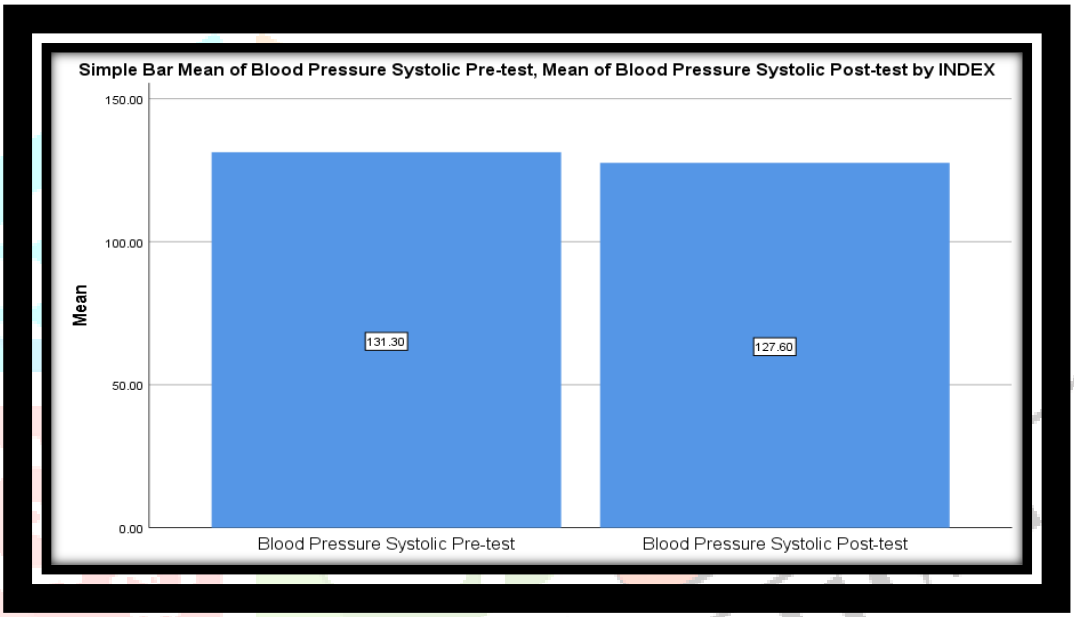
Table 6 shows that the descriptive statistics of the Systolic Blood Pressure. The result of the paired sample statistics shows that after getting the plyometric training the subjects Systolic Blood Pressure perform better (pre-test mean - 131.3000 & post-test mean - 127.6000) and subjects Systolic Blood Pressure was reduced.

Table 6.1

Paired Samples Test						
	Paired Differences			t	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean			
Systolic Blood Pressure Pre-test - Post-test	3.70000	3.43350	1.08577	3.408	9	.008

Table 6.1 shows paired sample "t" test of Systolic Blood Pressure. Where the result shows that there was significance difference were found (sig. 2-tailed .008). comparing both pre-test and post-test mean of the Systolic Blood Pressure shows the mean difference was 3.70000. So, we can conclude that due to the plyometric training the Systolic Blood Pressure was improved.

Figure 6



Diastolic Blood Pressure

Table 7

Paired Samples Statistics				
	Mean	N	Std. Deviation	Std. Error Mean
Diastolic Blood Pressure Pre-test	81.9000	10	4.45845	1.40989
Diastolic Blood Pressure Post-test	81.0000	10	2.00000	.63246

Table 7 shows that the descriptive statistics of the Diastolic Blood Pressure. The result of the paired sample statistics shows that after getting the plyometric training the subjects Diastolic Blood Pressure perform slightly better (pre-test mean - 81.9000 & post-test mean - 81.0000) and subjects Diastolic Blood Pressure was reduced.

Table 7.1

Paired Samples Test						
	Paired Differences			t	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean			
Diastolic Blood Pressure Pre-test - Post-test	.90000	4.14863	1.31191	.686	9	.510

Table 6.1 shows paired sample "t" test of Diastolic Blood Pressure. Where the result shows that there was no significance difference was found (sig. 2-tailed .510). comparing both pre-test and post-test mean of the Diastolic Blood Pressure shows the mean difference was .90000. So, we can conclude that due to the plyometric training the Diastolic Blood Pressure was slightly improved.

Figure 7

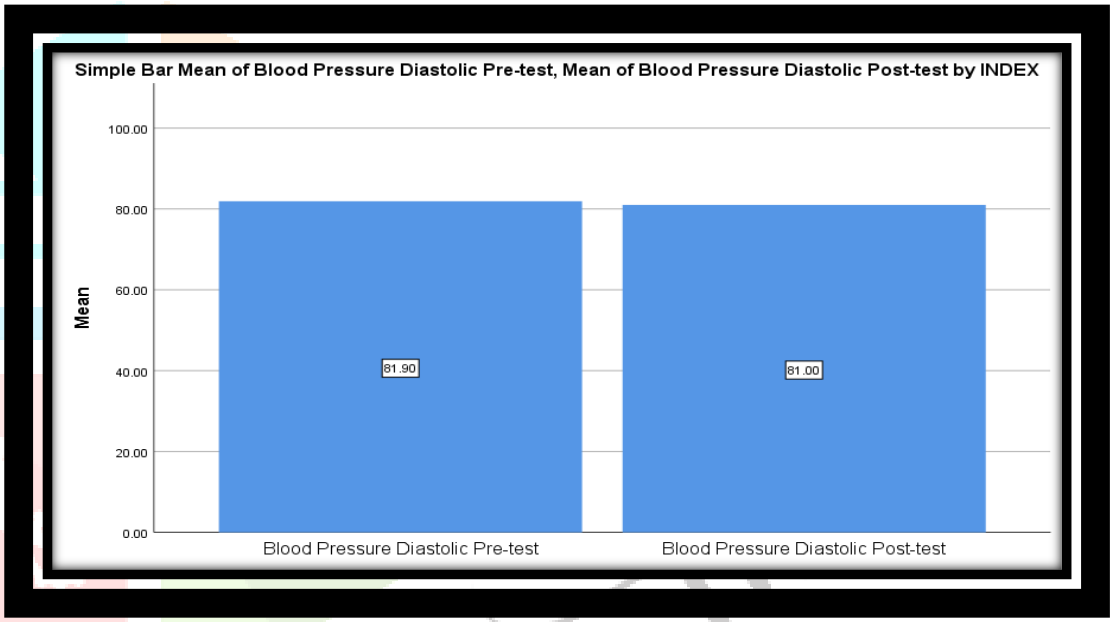


Table 8

Paired Samples Correlations				
		N	Correlation	Sig.
Pair 1	Bowling Speed Pre-test & Post-test	10	.993	.000
Pair 2	Throwing distance Pre-test & Post-test	10	.968	.000
Pair 3	Resting Heart Rate Pre-test & Post-test	10	.992	.000
Pair 4	Body Fat percentage Pre-test & Post-test	10	.997	.000
Pair 5	Vital Capacity Pre-test & Post-test	10	.956	.000
Pair 6	Systolic Blood Pressure Pre-test & Post-test	10	.877	.001
Pair 7	Diastolic Blood Pressure Pre-test & Post-test	10	.374	.287

Table 8 shows that Paired Samples Correlations of all the variables which selected by researcher. The result shows that all the variables pre-test and post-test scores (Bowling velocity-.000, Throwing

distance-.000, Resting Heart Rate-.000, Body Fat percentage-.000, Vital Capacity-.000 & Systolic Blood Pressure-.001) found significantly correlated to each other except Diastolic Blood Pressure (.287).

CONCLUSION

The results of this study showed that after a 12-week of plyometric training, subjects have shown a significant improvement in medium pace bowling velocities, throwing distance, Resting Heart Rate, Vital Capacity, Systolic Blood Pressure and also improve was found but not significance Diastolic Blood Pressure, Body Fat percentage.

All the subjects in the present study were moderately trained athletes to be given the plyometric training program which contributed to the significant increase in the various variables observed after the training procedure. The Twelve-week plyometric training program consists of series of functional exercises performed at high volume to simulate the movements and positions.

Following the overload principle, athletes performing a twelve-week program experience both muscle strength and endurance adaptability. The twelve-week program consists of a group of plyometric exercises performed intermittently with appropriate rest intervals between sets to challenge both anaerobic and aerobic capacity of the shoulder, such as Pretz et.al discussed previously.

Holcombe et al. discussed that plyometric training and the use of shortening cycles improve the ability of the nervous system and muscles to generate maximum force in the shortest possible time, thereby closing the gap. between speed and power.

In a study of 16 rugby union players, high-resistance exercises were reported to increase strength by 4.5%.

Current study shows that plyometric training has a positive effect on skill related performance (bowling velocity & throwing distance) and Physiological variables (Resting Heart Rate, Vital Capacity, Systolic Blood Pressure) may result from improved rotator cuff cognition, kinematics, and endurance, in addition to the strength; power gains and decrease the risk of shoulder injuries in medium pace cricket bowlers. from twelve weeks of plyometric training.

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