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M Sankar
Research Scholar, Department of Physical Education, Bharathidasan University, Tiruchirappalli, Tamil Nadu, India

Dr. A Mahaboobjan
Professor, Department of Physical Education, Bharathidasan University, Tiruchirappalli, Tamil Nadu, India

Corresponding Author:
Dr. A Mahaboobjan
Professor, Department of Physical Education, Bharathidasan University, Tiruchirappalli, Tamil Nadu, India

Influence of ballistic-power training on selected strength parameters and playing ability of cricket players

M Sankar and Dr. A Mahaboobjan

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Abstract
The purpose of the study was to find out the ballistic-power training on selected strength parameters and playing ability of cricket players. To achieve the purpose of the study thirty cricket players have been randomly selected from various colleges in and around Salem district, Tamil Nadu State, India. The age of the subjects were ranged from 18 to 25 years. The criterion measures strength parameters such as shoulder strength & back strength and playing ability were selected. The subjects had past experience of at least three years in cricket and only who those represented their respective college teams were taken as subjects. The participants, as experimental and control groups, were randomly divided into two equal groups of fifteen each such as experimental and control groups. For six weeks, three days a week, one session daily, the experimental group took part in the ballistic-power training. The control group had things to do with their day-to-day operations and had no exceptional coaching. To determine whether there had been a significant improvement, the dependent 't' test was used to analyze the data, and an ANCOVA was used to see whether there had been any significant differences between the groups. To examine the level of significance difference, if any, across groups, the.05 level of confidence was fixed. It was concluded that 6 weeks of ballistic-power training programme was useful for improving the strength parameters such as shoulder strength and back strength and playing ability of cricket players.

Keywords: Ballistic power training, shoulder strength, back strength, playing ability

Introduction
Within the realm of athletics and recreation, cricket is regarded as unique. It is the pinnacle of sports and an incredibly stimulating pastime that tests commitment and physical condition while being fun. There are several factors that affect a cricket player's performance, such as skill, technique, tactics, fitness, and training. Because modern cricket demands a higher level of fitness, current sports management is looking for training strategies to keep the players injury-free and healthy enough to perform (Chris Beardsley, 2013) [2]. Ballistic training is one of the most crucial techniques for building power. A full second after the start, a muscle cannot reach its fullest potential with traditional strength training (nonballistic). As opposed to this, ballistic training compels the athlete to use their muscle's maximum speed within 0.2 seconds or less-exactly the same time as their arm would in a competitive throw. Elite athletes initially employed ballistic training, sometimes referred to as power training, as a means of increasing their explosiveness. The Greek verb ballein, which meaning "to throw", is where the word ballistic originates. The athlete in this kind of training accelerates and lets go of the weight into "free space." Exercises like bench throws, jump squats, cleans, snatches, and push presses are frequently used in ballistic training (With Scheett, 2004) [2]. The body of an athlete undergoing ballistic training is compelled to activate and recruit fast twitch muscle fibres. Given that particular muscle fibres have the highest potential for strength and growth, this is significant. Muscles that are trained in ballistics must become accustomed to contracting forcefully and swiftly. The central nervous system must coordinate and generate the maximum force in the shortest amount of time for this training (Braund, 2003) [2].
The ‘science of success’ has received a boost in recent years with the growing availability of large datasets describing individual’s careers from which much can be learned and importantly predicted.

The increasing shift towards collaborative and team-based effort (performance) in recent decades has made it more important to quantify and predict teamwork. However, the translation of the predictability in individual performance to team performance is still missing (Fraiberger, *et al.*, 2018) [4]. To develop novel statistical tools to uncover the temporal features that are characteristic of a set of performances. We explore the complete history of International cricket to quantify individual and team performances (Mukherjee, 2014) [5]. We study the sequence of consecutive performances of each player and team. By investigating the scores of individual players against the index of the games within the career, we note that success breeds success in individual career. We further document that the best performances in a given player's career are clustered in time. We uncover the presence of hot hands in individual careers in both formats of the game but the absence of the same in team performances (Carron, *et al.*, 2002) [3].

Methodology

The purpose of the study was to find out the ballistic-power training on selected strength parameters and playing ability of cricket players. To achieve the purpose of the study thirty cricket players have been randomly selected from various colleges in and around Salem district, Tamil Nadu State, India. The age of subjects were ranged from 18 to 25 years. The criterion measures strength parameters such as shoulder strength & back strength and playing ability were selected. The subjects had past experience of at least three years in cricket and only who those represented their respective college teams were taken as subjects. The participants, as experimental and control groups, were randomly divided into two equal groups of fifteen each such as experimental and control groups. For six weeks, three days a week, one session daily, the experimental group took part in the ballistic-power training. The control group had things to do with their day-to-day operations and had no exceptional coaching. To determine whether there had been a significant improvement, the dependent 't' test was used to analyse the data, and an ANCOVA was used to see whether there had been any significant differences between the groups.

Training Protocol

Three major resistance exercises were used for ballistic power training groups: Leg press, bench press, and half squat. ballistic training power performed all exercises in every session with this exact order, for 6 weeks, 3 times per week. For the ballistic power training group, the load was set to meet 6 Repletion Maximum (RM) and it was increased frequently (once or twice each week) in order to meet the 6 RM. The rest between sets was 2-3 min, and between exercises 3-4 min. Specifically, in the present study, in leg press and bench press the load was thrown as far as possible with two assistants catching it at the end of its projection. The ballistic squat was performed in a smith machine, so that the subjects jumped as high as possible in the air. Special pads were placed between the barbell and the neck in order to avoid injuries. Subjects in the ballistic power training group were instructed to perform each repetition with maximum speed. In this training group, the rest between repetitions was approximately 2-3 seconds. The load was increased by 2.5% every week starting from 30% in the first week and concluding to 42.5% in the eighth week of the initial 1RM. During the 6 weeks training period. The Control group refrained from any systematic exercise training during the same period.

Table 1: Ballistic Power Training Schedule

S. No	Name of Exercise	Training (3 Sessions/wk)	Rest Between Sets	Rest Between Exercises
1	Leg Press Throw (45° Inclination)	4 sets / 8 reps (30% of 1 RM)	1-2 min	2-3 min
2	Bench Press Throw (Smith machine)	4 sets / 8 reps (30% of 1 RM)	1-2 min	2-3 min
3	Jump Squat (Smith machine, knees 90°)	Sets/8 reps (30% of 1 RM)	1-2 min	2-3 min
4	Drop Jumps (from 45 cm)	3 sets/8 jumps	1-2 min	2-3 min

Table 2: Criterion Measure

S. No	Tools	Measures
1	Push-up	Count of 1 min (Shoulder Strength)
2	Back Dynamometer	Grasp of the Bar (Back Strength)
3	Playing Ability	Subjective Rating

Results

Table 3: Show the Mean and 't' Ratio of Strength Parameters and Playing Ability of Cricket Players

S. No	Variables	Mean and SD	BPTG	CG
1	Shoulder Strength	Pretest mean	35.33	35.44
		SD (±)	0.24	0.31
		Post-test mean	38.43	35.83
		SD (±)	0.28	1.17
		't' test	29.69*	1.46
2	Back Strength	Pretest mean	78.79	78.98
		SD (±)	0.48	0.61
		Post-test mean	86.52	80.46
		SD (±)	0.90	3.39
		't' test	26.00*	1.87
3	Playing Ability	Pretest mean	5.31	5.24
		SD (±)	0.10	0.46
		Post-test mean	7.47	5.72
		SD (±)	0.06	1.02
		't' test	27.47*	1.85

The Table III show that the pre-test mean value of shoulder strength on experimental group and control groups are 35.33 and 35.44 and post-test means are 38.43 and 35.83. The obtained dependent t-ratio values between the pre and post test score of experimental and control groups are 29.69 and 1.46. The table value required for significant difference with DF 14 at 0.05 level is 2.15. Since, the obtained "t" ratio value of experimental group is greater than the table value, it was understood that the ballistic-power training group had significant improvement on shoulder strength. However, the control groups were not shown significant improvement. The obtained 't' value is lesser than the table value, as they not subject to any specific training.

The pre-test mean value of back strength on experimental group and control groups are 78.79 and 78.98 and post-test means are 86.52 and 78.98. The obtained dependent t-ratio values between the pre and post test score of experimental and control groups are 26.00 and 1.87. The table value required for significant difference with DF 14 at 0.05 level is 2.15. Since, the obtained "t" ratio value of experimental group is greater than the table value, it was under should that the ballistic-power training group had significant improvement the Back Strength. However, the control groups significantly not improvement. The obtained 't' value is less than the table value, as they not subject to any specific training.

The pre-test mean value of performance variables on experimental group and control groups are 5.31 and 5.24 and post-test means are 7.47 and 5.72. The obtained dependent t-ratio values between the pre and post test score of experimental and control groups are 26.00 and 1.87. The table value required for significant difference with DF 14 at 0.05 level is 2.15. Since, the obtained "t" ratio value of experimental group is greater than the table value, it was under should that the ballistic-power training group had significant improvement the performance variables. However, the control groups significantly not improvement. The obtained 't' value is less than the table value, as they not subject to any specific training. The pre, post and adjusted mean values of shoulder strength and back strength of both experimental and control groups are graphically represented in the Figure-1 & 2.

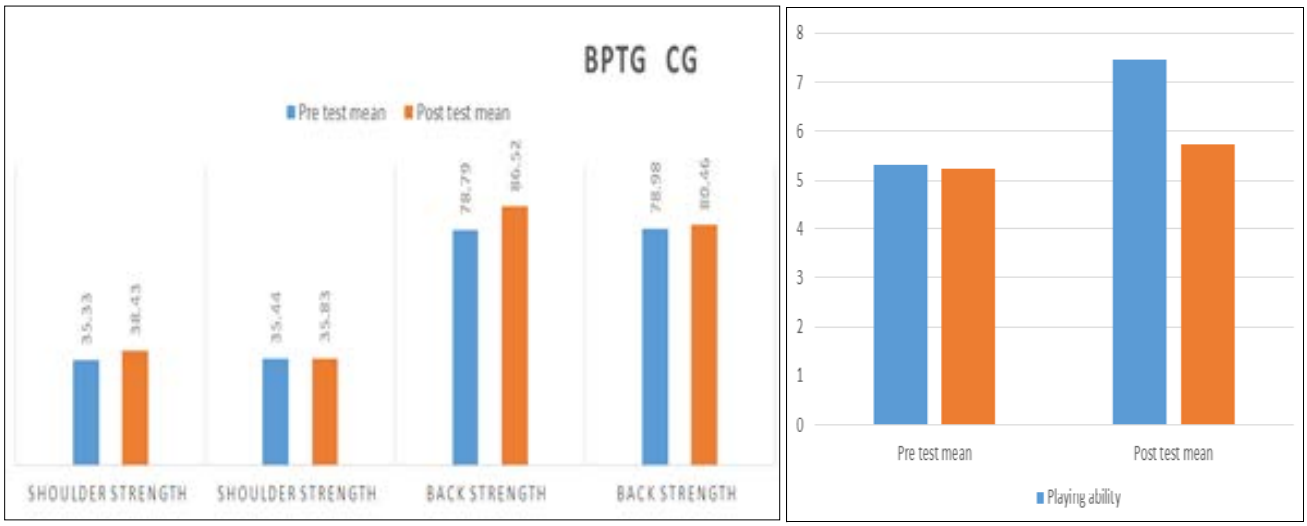

Fig 1 & 2: The pre, post and adjusted mean values of shoulder strength, back strength and playing ability of both the experimental and control groups

Table 4: Analysis of covariance for experimental and control groups on shoulder strength, back strength and playing ability of cricket players

Variables	Adjusted post-test means		SOV	SS	DF	MS	F-ratio
	BTG	CG					
Shoulder Strength	38.51	35.75	B.S	54.65	1	54.65	90.37*
			W.S	16.32	27	0.60	
Back Strength	86.68	80.30	B.S	296.80	1	296.80	55.02*
			W.S	145.63	27	5.394	
Playing Ability	7.45	5.73	B.S	21.92	1	21.92	42.12*
			W.S	14.050	27	0.52	

* Significant at. 0.05 level of confidence (The table value required for Significance at 0.05 level with DF 1 and 27 is 4.21).

According to Table-II, the ballistic-power training group and control group's adjusted post-test means for shoulder strength, back strength and playing ability were 38.51, 86.68, 7.45, and 35.75, 80.30, 5.73, respectively. The post-test mean's computed F-ratio of 90.37, 55.02, and 42.12 is higher than the table value of 4.21 for DF 1 and 27, which is necessary for significance at the 0.05 level of confidence. According to the findings, there was a substantial difference in strength, back strength and playing ability between the experimental and control groups. Since, the obtained F ratio value of experimental group is greater than the table value, it was under should that the ballistic-power training group had significant improvement on strength parameters such as shoulder strength & back strength and playing ability.

Discussion on Findings

The results of the current study demonstrated that cricket players upper extremities strength parameters and playing ability increased after 6 weeks ballistic-power training programme. However, there is dint improve upper extremities strength and playing ability in the control group. These findings are in line with the majority of other studies showing the value of ballistic-power training. According to (Zaferanieh, *et al.*, 2021) [8] the results of the present study

suggest that physical fitness adaptations can be increased similarly after 8 weeks of power and ballistic training, in table tennis players. (Newton *et al.*, 1999) [6] Results lend support to the effectiveness of ballistic resistance training for improving vertical jump performance in elite jump athletes. (Pardeep Kumar and Pankaj Pandey 2016) [7] 6 weeks ballistic training improving shoulder strength and back strength of cricket players.

Conclusion

It was very clear and concluded that the 6 weeks of ballistic-power training significantly improved the selected strength parameters such as shoulder strength & back strength and playing ability of cricket players.

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