Pakistan Journal of Rehabilitation OPEN ACCESS

ORIGINAL ARTICLE **Volume 12(Issue 2), 2023 | Page No.120-126**

DOSE RESPONSE OF PLYOMETRIC TRAINING ON AGILITY IN CRICKET PLAYERS

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ABSTRACT

Aims of Study: From last one decade, advancements in formats of cricket demand agility in the players so that they can play in better way without injury. The aim of this study was to determine which dose of plyometric training is effective to enhance agility in cricket players.

Methodology: Randomized Controlled Trial was registered in US clinical Trial registry (NCT04350385). 40 cricket players were recruited in study, out of which n=20 players were placed in experimental group and n=20 players were in control group. Assessments were taken as baseline and after third week and on sixth week through Illinois Agility Run test, T test and Vertical jump test. Data analysis was done through SPSS version 23. Independent t test was used for between group analysis and paired t test for within group.

Results: Group comparison through T-agility and Illinois test shows significant effect in experimental group (p>0.009). Post intervention Mean±SD of vertical jump test in experimental group was 31.90±2.55 with significant effect (p=0.001).

Limitation and Future Implications: This study can be done on both genders. Players can improve their performance by working on plyometric training and agility.

Originality: This was original work and never published before.

Conclusion: It is concluded from this study that plyometric training is effective in improving agility of the cricket players. Players can improve their performance by working on plyometric training and agility.

Keywords: *Agility, athletes, cricket player, athletic performance, plyometric training, vertical jump.*

Introduction

Over the past two decades cricket attains a rise in its popularity with over 100 nations registered with International Cricket Council (ICC)[1]. Cricket is the most commonly played game of the present era with different formats like T20, One Day International and test matches[2,3]. The cricket players are exposed to more demanding schedules because of the longer season with more time spending on training and practice[4]. Players are required to produce certain and quick movements

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Citation: Latif D, Afzal MF, Jabbar R, Arif A, Tariq I, Aftab A. DOSE RESPONSE OF PLYOMETRIC TRAINING ON AGILITY IN CRICKET PLAYERS. Pakistan Journal of Rehabilitation. 2023 Jul 6;12(2):120–126. Available from: https://doi.org/10.36283/pjr.zu.12.2/016

Received: Tues, Dec 7, 2021 **Accepted:** Mon, June 26, 2023 **Published:** Thurs, July 06, 2023

during the play so that there must be intact physiological and neuromuscular coordination[5]. Therefore, fitness for cricket players is an important component for best performance in field and also the lower limb muscles are used for powerful activities[6]. There are different distinct psychological demands in cricket according to playing positions[7]. Thus, the professional cricket players face unique competitive demands that require psychological and behavioral control to manage the stress and under pressure performance[8].

Studies report different sites of injuries in cricket[9]. The upper limb injuries in cricket accounts for 19.8-34.1% of the total Injuries whereas injuries to the lower limb varies from 22.8% to 50.0%[4,10]. The hamstring strain remains the most common with highest prevalence over the decade[11]. Study reported that incidence of hamstring strain was placed fourth in 2006 to 2007[12]. From 2007–2008 onward, though, hamstring strains have been the most common injury every season[13]. Lack of flexibility, muscular strength imbalance, previous history of injury and age are considered risk factors of hamstring injuries[14]. Associations of cricket issued recommended international consensus definitions methods for the injury monitoring in 2005 which further updated in 2016[11]. This has given rise to cricket injury surveillance publications that have employed relatively consistent methodologies[15,16].

Interventions put in place to reduce the incidence of hamstring strain injuries by addressing modifiable risk factors have focused primarily on increasing eccentric strength, correcting strength imbalances and improving flexibility[17]. A new and famous strategy of exercise which is considered less time consuming and very effective to prevent from injury is plyometric training[18]. Plyometric are training techniques used by athletes in all types of sports to increase strength and explosiveness[19]. Plyometric training involves high intensity movements such as jumping, bounding exercises that needs to be performed explosively and quickly[20]. These quick movements are more often related to development of agility[21].

Agility is the ability of an individual to produce and synchronize quick movements in an effective manner[22]. A study conducted in 2011 concluded that speed, agility and quickness physical activity program intervention had a progressive outcome on power performance in young soccer athletes[23].

There are different studies conducted to determine the effect of plyometric training on agility, studies show role of 7-8 weeks effect of plyometric training on agility. There is no study conducted yet to determine the effect of 4 week of plyometric training on agility in cricket players. The objective of the study is to determine the effect of plyometric training on agility in cricket players.

Methodology

The study design was randomized controlled trial and carried out from Aug 2019-Jan 2020 (06 months) at Al Nazar Cricket academy Rawalpindi. Ethical approval was taken from the research committee of Riphah International University, Islamabad and trial registry was also done in US clinical Trial Registry before recruiting the participants (NCT04350385). Sampling technique was Non-Probability Purposive Sampling. Sample size was calculated by using open epi tool. 40 players who fulfill the inclusion criteria were divided randomly into two groups. 18 players were included in control group and 19 players were included in experimental group. Consent was taken from very participant before the assessment. Those players who registered with the club from last one year, actively participating in the training programs, aged between 18-25 years were recruited in the study. Those players who suffered from any musculo-skeletal or sports related surgery in last 6 months were removed from the study. Agility of players were assessed at baseline on zero week through T agility run test,[24] Illinois test[25] and vertical jump[26] were assessed through squat vertical jump. Data entry and analysis were done through SPSS version 23. Test of normality (Shapiro Wilk Test) were applied before further analysis to check normal distribution of data.

Results

There are 37 participants in this research under age group of 18 to 25. Male cricket players who registered with the club from at least one year were recruited. It has been checked that all male cricketers did not participate in any periodized resistance training program. The demographic information of study shows that Mean ±Standard Deviation of athlete age is 21.29±1.63 years. The mean ±SD of weight in kg is 65.97± 4.79 and mean value and SD of height in inches is 68.15± 1.20 with mean ±SD of BMI 21.94±1.62. Mean value and SD of experience of players in game is 2.38±0.59.

Demographics	Treatment group Experimental Group Mean±SD	Control Group Mean±SD
Age (Years)	21.05±1.58	21.55±1.68
Weight (Kg)	65.6±4.86	66.36±4.82
Height (Inches)	68.14±1.23	68.16±1.21
BMI (kg/m^2)	21.83±1.69	22.06±1.59
Experience of players (Years)	2.31±0.67	2.44±0.51

Table 1: shows Mean±SD of demographics of all players

The mean value ±SD of a T agility test in control group pre intervention is 21.37 ±3.07 and in experimental group is20.87±3.09. The mean value and standard deviation of Illinois agility test of control group pre intervention is 22.90 ±1.58 and experimental group is 23.07 ±1.45. The mean value ±SD of vertical jump height in control group pre intervention is 18.00±1.92 and in experimental group is18.36 ±2.19. The mean value and SD of T agility test in control group post intervention is18.33±5.03 and in experimental group is14.19±4.02 with p value (0.009). The mean value and standard deviation of Illinois agility test of control group post intervention is 19.74±0.79 and for experimental group is 17.34±0.69 with p value (0.001). The mean value and SD of vertical jump height in control group post intervention is 25.18 ±2.11 and in experimental group 31.90 ±2.55 with p value (0.001).

Variables		Group	Mean	SD	P value
T Agility Test	**PRE**	**Control**	21.37	3.07	
		Exp.	20.87	3.09	0.62
	POST	**Control**	18.33	5.03	
		Exp.	14.19	4.02	0.009
Illinois Agility Test	**PRE**	**Control**	22.90	1.58	
		Exp.	23.07	1.45	0.737
	POST	**Control**	19.74	0.79	
		Exp.	17.34	0.69	0.001
Vertical Jump	**PRE**	**Control**	18.00	1.92	
		Exp.	18.36	2.19	0.602
	POST	**Control**	25.18	2.11	
		Exp.	31.90	2.55	0.001

Table 2: Pre and Post Mean +SD of T Agility test, Illinois Agility Test and Vertical Jump Test in Control and Experimental Group

Discussion

The study aims to determine the effects of dose response of plyometric training program on speed and agility in young cricket players. This study is based on three tests, T test, Illinois test and Vertical height jump test that are performed on interventional based two groups experimental with 6 weeks of training protocol. Performing these tests before and after intervention, it has seen that plyometric training has a significant effect on speed of the cricket players. The plyometric group shows improvement in speed and agility but the group with traditional training program has no improvement in results. This study shows significant improvement in the speed and agility test measures after plyometric exercises.

The finding of study is that the cricket players who added plyometric training with their traditional program shows improvements in the speed and agility as compared to other cricket players who just focus on their traditional training program and are not included in plyometric training group. This study is specially targeted to the club cricket players engaged to the plyometric training program. The plyometric training not only improves speed and agility but it also improves the strength and power of athletes. The improvement in speed and agility is helpful for the cricket players while performing in the game on various aspects like fielding, bowling and batting. Potteiger et al conducted a study on plyometric training and reported that good coordination between brain and proprioception leads to enhance motor units[21]. It is not clear yet that this adaption is due to neuronal firing or impulses came from the spinal cord[27].This study showed that plyometric training improves the physical fitness and strength of cricket players. Michael G. Miller et al reported in a research that plyometric is effective in enhancing agility of athlete's after 6 week application of plyometric[28].

In our study, significant difference occur in players agility after plyometric training in experimental group This effect in agility and speed is good for young cricket players where they need quick change in position as demand of the sport. Parsons and Jones et al conducted a research who recruited long tennis players for plyometric training and concluded that there was significant improvement happen in agility and speed of players[29]. Renfro conducted a study with title Summer Plyometric Training on soccer players and concluded that there were better gains in agility and speed[30]. A variety of training studies showed that plyometric training with agility enhances the performance of athletes as well as strength and power also. Another study conducted by Robinson and Owens to assess agility measured by vertical, lateral and horizontal plyometric jumps and stated that there were significant improvements in agility.

Various studies reported utilizing plyometric training have shown improvements in different areas of different sports, including vertical jump in basketball[31] and G Markovic et al conducted a research on neuro-musculoskeletal and effect on lower limbs performance and reported an effective plyometric exercise in enhancing strength of lower limbs and power in adults[32].

Conclusion

It is concluded from this study that plyometric training is effective in improving agility of the cricket players. Players can improve their performance by working on plyometric training and agility.

Disclaimer

It was part of the Thesis project of Master of Science in Physical Therapy (Sports Physical Therapy).

AUTHORS' CONTRIBUTION:
The following authors have made substantial contributions to the manuscript as under:
Conception or Design: Dr. Danish Latif
Acquisition, Analysis or Interpretation of Data: Dr. Faheem Afzal, Dr Rameela & Dr Iqbal Tariq
Manuscript Approval & Writing: Dr Danish, Dr Adeela, Dr. Anam Aftab, Dr. Faheem Afzal
All authors acknowledge their accountability for all facets of the research, ensuring that any concerns regarding the accuracy or integrity of the work are duly investigated and resolved.

ACKNOWLEDGEMENTS: The authors thanks to all participants.

INFORMED CONSENT: (informed consent was signed by all participants in both Urdu and English language)

CONFLICT OF INTEREST: N/A

FUNDING STATEMENTS: N/A

ETHICS STATEMENTS: The protocol of the present study was registered by the local ethics committee of Riphah research ethical committee approval code Riphah/RCRS/REC/00540 registered in Clinical Trial.gov NCT04350385.

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