



# “EFFECT OF LADDER TRAINING ON SPEED AND EXPLOSIVE POWER AMONG SUB-ELITE CRICKET PLAYERS”

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**Abstract: Background:** A cricket player is expected to perform a large number of sprints, jumps, lunges and rapid directional changes along with fast movements of moderate to high intensity. Due to the demands of the sport running speed and explosive power has become an essential athletic quality. Sprinting is running for relatively short distance in a brief period of time. Standing Broad Jump is a field test used to assess explosive leg power or ability to apply force in horizontal direction. Ladder training is fitness drill which increases neural connections with foot movements that mimic the quick thinking that players must do when on field

**Aim:** To study the effect of ladder training on speed and explosive power among sub elite cricket players.

**Methodology:** Participants were briefed about the study and the intervention. Their informed written consent was taken. 66 participants were selected based on the inclusion criteria. Prior and after the treatment both the outcome measures, 50meter dash test and Standing Broad Jump were measured. Participants were randomly divided into two groups with n=33 in each group. Group A went with normal routine while group B went with ladder drill. The treatment was given for 1 hour/day for 6 weeks with a fixed protocol and fixed progression set week by week.

**Outcome measures:** Pre and post ladder drill outcome measures, 50meter dash test and standing broad jump are measured.

**Results:** Based on the results of the test analysis at 5% significance level, there is a significant statistical reliable difference between the pre & post treatment values with p-value is less than the 5% significance level (i.e.  $0.001 < 0.05$ ) for 50meter dash test groups analysis is significant for 50 METER DASH TEST across both the time frames at 5% level significance. Group B with a higher value is better than the Group A as group analysis is significant for STANDING BROAD JUMP at post time frames at 5% level significance. Group B with a higher value is better than the Group A

**Conclusion:** This study concluded that ladder training shows significant effect on speed and explosive power among sub-elite cricket players.

**Keywords:** *sub-elite cricket players, ladder training, standing broad jump, explosive power, 50 meter dash test.*

## I. INTRODUCTION

There are different types of sports played around the globe like basketball, football, throw ball badminton, volleyball, cricket, futsal, martial arts etc. Great way of staying active and healthy both physically as well as mentally is participating in sports. Cricket is a sport that is popular all over the world. At the highest level a vigorous exercise take place while playing this game mainly three formats are used all around the world: test, one-day and 20-20. When compared to match length, shorter game formats are typically more physically demanding as they incorporate more maximal sprints during fielding, bowling, and batting. Cricket is referred to as an interval sport that combines both anaerobic and aerobic element. Cricket places a lot of physical demands on the body, including those related to muscular strength, endurance, speed, agility, and power along with sudden actions that involves both slow and quick movements.<sup>[1]</sup>When fielding in 1day internationals and test matches, the average sprint distance is roughly 15 to 18

metres.<sup>[8]</sup>Physical characteristics are an important factor for one-day competitions, particularly for the training of fast bowlers, batsmen, fielders, and wicket-keepers.<sup>[9]</sup> Linear sprint tests should include distances that focus on the acceleration phase of a maximal sprint<sup>[11]</sup>. An elite player during the game are frequently required to perform sprints, hops, lunges and quick directional change in addition to quick movements of moderate to high intensity linked to repeating activities of short duration but higher intensity. Due to these requirements, running speed, power, and strength have emerged as crucial athletic traits for cricket players. Speed is the capacity to move the body as swiftly as possible in a single direction. It is, in other words, the capacity to work continuously in the same manner and within the smallest amount of time.<sup>[2]</sup> Basically the main highlight of the game is running as these contribute to score between the wickets<sup>[8]</sup>, when doing tasks that call for a single order movement to generate high speed when released, such as throwing, jumping and reaction actions, power is the primary predictor of performance.<sup>[2]</sup>

Sports that need explosiveness and quick maximal energy generation necessitate explosive power as a necessary prerequisite.

There are various essential factors such as explosive power that can elevate the performance of the players in cricket.<sup>[11]</sup> After players have finished a general training programme, strength and conditioning coaches should concentrate on enhancing their lower body speed (explosive and repetitive) and anaerobic upper body power. Because of the functional requirements during the delivery stride, the bowling group may demand more flexibility in the lower lumbar and hamstrings.

In study it was discovered that participants who had followed a systemic periodized training programme fared better performance ratings for sprinting, upper body power and flexibility tests than their peers, further demonstrating the benefits of a long term annual periodized programme for cricket players and the performance during matches is the result and expression of the overall personality of the sportsmen.<sup>[9]</sup>

Running a relatively short distance quickly is known as sprinting. Running related sports have made use of it in order to strike targets fast, stop opponents, or catch them.<sup>[5]</sup> A field test known as the standing broad jump (SBJ) or standing long jump (SLJ) is used to gauge an athlete's explosive leg power or their capacity to exert force in a horizontal direction. The SBJ test employed a basic technique that is time efficient and does not require complex equipment.<sup>[6]</sup>

Recently, a very pleasurable training approach known as ladder drills- a type of ladder exercise that is required to improve an athlete's foot speed, agility, and foot coordination and was devised as fitness equipment utilised in several sports and that resembles a ladder.

Trainers seeking for strategies to help athletes improve their speed, coordination, balance, and agility frequently use this task ladder methodology. Ladder are normally made up of plastic attached to nylon rope to form a box measuring each box about 12-15 inches, standard length of the ladder is 10 yards long. Ladder drills have been demonstrated to increase speed, agility and power in recent studies.<sup>[2]</sup> For all sports where agility, leg explosive strength, aerobic capacity, and speed are crucial, speed ladder workouts are crucial. This exercise is a great way to enhance your physical condition since it gets your complete body moving, especially the muscles that are needed for activities like jumping, hitting, kicking, and sprinting quickly.<sup>[4]</sup>

Ladder training should be performed after warming up so that muscles are fresh and ready to provide 100% while maintaining proper technique. It encourages coaches and players to use their imaginations, and these drills can help maintain your physical fitness and it is also good for your overall body workout and kinesthetic awareness.<sup>[10]</sup> Ladder drills can strengthen brain connections by simulating players to do fast thinking and reaction needed during hitting or fielding with foot motions. For fielding and running down the pitch, athletes must be able to move their feet swiftly while also maintaining their balance. Ladder drills should be progressed from simple drills to more complex ones in order to maximise their effectiveness. Additionally, by forcing various actions up the task ladder, it stimulates the movements needed throughout competition.<sup>[4]</sup>

## II. NEED FOR STUDY

- Running speed has become an essential athletic quality for cricketers and therefore there is a need to improve running speed in cricket players
- Study shows that explosive power is an essential pre-requisite for sports that demand explosiveness and fast maximal energy production
- Studies have shown that ladder training and plyometric training has a significant effect on improving explosive power among Kho-Kho players
- Previous studies have shown that ladder training and SAQ training has a significant effect on running speed among badminton players
- There are lack of evidences that states that ladder training has a significant effect on speed and explosive power amongst sub-elite cricket players
- Therefore, there is a need to study to find the effect of ladder training on speed and explosive power in sub-elite cricket player

## III. AIM AND OBJECTIVES

**AIM:** To study the effect of ladder training on speed and explosive power among sub-elite cricket players

### OBJECTIVES:

- 1) To find the effectiveness of ladder training on speed in sub-elite cricket players
- 2) To find the effectiveness of ladder training on explosive power in sub-elite cricket players

#### IV. HYPOTHESIS

**NULL HYPOTHESIS:** There will be no significant effect of ladder training on speed and explosive power among sub-elite cricket players.

**ALTERNATE HYPOTHESIS:** There will be significant effect of ladder training on speed and explosive power among sub-elite cricket players.

#### V. REVIEW OF LITERATURE

1)N Chandrakumar, C Ramesh (2015)

The purpose of the study was to find out the effect of ladder drill and SAQ training on speed and agility among sports club badminton players. In order to achieve the purpose of the study thirty men sports club badminton players were randomly selected from Dindugal city sports clubs and they were equally divided in to three groups of ten each as experimental group-I, experimental group-II and control group. The level of confidence was fixed at 0.05 Based on the results the study it was concluded that the ladder drill and SAQ training were significantly improved the speed and agility among sports clubs badminton players.

2)Mohd Waseem Jan Padder<sup>1</sup>, Dr.G. Ramesh<sup>2</sup> (2019)

The main purpose of the study was to determine the impact of ladder training and plyometric training on agility and explosive power among school level Kho-Kho players. Forty-five male Kho-Kho players from Higher secondary school Vessu Anantnag, Higher secondary school Wanpoh Anantnag and Higher secondary school Kelam kulgam in Kashmir, who had participated in interschool competition, were selected as subjects at randomly and their age ranged from 14 to 17 years. The selected subjects (N=45) were randomly assigned in to three equal groups of fifteen Kho-Kho players each as experimental group-I, experimental group-II and control group. The level of confidence was fixed at 0.05. Based on the study it was concluded that ladder training and plyometric training were significantly improved the agility and explosive power among school level Kho-Kho players.

3)Dr Nitin Bariya (PT), Dr Keyur Patel (PT), Dr Ishan Pathak (PT) (2019)

To study the Test-Retest reliability of the 50 Meter Dash Test as a measure of sprinting performance in collegiate sprinters. Total 44 collegiate sprinters (male=26 and female=18) from various departments of Parul University were included in this study. The test was performed over 2 sessions, each separated by two weeks. All the procedures for the test were administered by the same individual. Results: The ICC value and SEM for the sprinting performance of 50 Meter Dash Test were 0.904 (95% CI) and 0.423 seconds respectively. Conclusion: This research shows the excellent Test-Retest reliability of the 50 Meter Dash Test as a measure of sprinting performance in collegiate sprinters.

4) Zarizi Ab Rahman; Azlan Ahmad Kamal; Mohad Anizu Mohd Noor, et al.(2021)

This study aims to determine the reliability, validity, and develop norm reference among adolescents. The evidence of the reliability, validity, norm need to establish in the particular population to support the interpretation of the scores. This study involved 60 subjects and six raters for reliability and validity. 417 subjects for norm development. The ICC, test-retest, and Pearson Correlation were used to determine the reliability. Independent sample t was used to determine the validity. The standard deviation method was used to construct the norm reference. Findings showed the ICC was high among male raters (.96) and female raters (.99).

5) Nanda Eriko Pratama, Edy Mintarto, Nining Widyah Kusnanik

The purpose of this study is to analyze about: (1) the influence of ladder drills exercise towards speed, liveliness, and power of limb muscle; (2) the influence of jump rope exercise towards speed, liveliness, and power of limb muscle; (3) the difference between the influence of ladder drills and rope jump exercises towards speed, agility, and power of limb muscle. Based on the above analysis, it can be concluded that there is a significant influence of ladder drills and rope jump exercises towards increasing speed, agility, and limb muscle power. Ladder drills are more effective than rope jump exercises and control groups in increasing speed and agility. While rope jump exercises are more effective than ladder drills and control groups in increasing limb muscle power

6) Pramod R, Dr. Divya K (2019)

The purpose of study was to find out the influence of ladder training on speed among Egyptian school students. Thirty school boys were randomly selected subject from studying Ideal Indian School, Doha Qatar. And their age ranged between 13 and 17years. The selected subject were divided into two groups with fifteen (N=15) subject each. Group I underwent ladder training Group II served as control group. The result of the study shows that 6 week of ladder training programme have significantly increased on speed.

#### VI. METHODOLOGY AND MATERIALS

##### METHODOLOGY:

- 1) Type of study: Experimental study
- 2) Type of sampling: Convenient sampling
- 3) Study design: Randomized control trial
- 4) Sample size: 66(33+33)
- 5) Study duration: 6 months
- 6) Study setting: Cricket clubs in Miraj, Kupwad City

**MATERIALS:**

- 1) Stopwatch
- 2) Task ladder
- 3) Cones markers
- 4) Measuring tape
- 5) Running track or marked area of 50 meters on plane surface

**Figure 1: Stopwatch**



**Figure 2: Task Ladder**



**Figure 3: Cones**



**Figure 4: Measuring Tape**



## VII. INCLUSION AND EXCLUSION CRITERIA

### INCLUSION CRITERIA

- 1) Males of age group between 17-28 years
- 2) Sub-elite cricket players

### EXCLUSION CRITERIA

- 1) Musculoskeletal injury in past 1 year

## VIII. OUTCOME MEASURES

### 1. 50 METER DASH TEST

ICC value were 0.904

- The procedure involved running over 50 meters of a single maximal sprint, with the time registered.
- There will be a comprehensive warm up, including the start of some practice and accelerations.
- Participant is told to start from a standing posture stationary (hands could not be in contact with the ground), with one foot before the other. The front foot had to be right behind the starting line.
- Once the participant is geared up and motionless, the instructor instructs "ready" then "go" instructions.
- The instructor provides advice for optimizing speed (such as staying low, driving fast with legs and arms) and motivating the participant not to slow down until crossing the finish line.<sup>[5]</sup>

### 2. STANDING BROAD JUMP TEST:

ICC for male raters (.96)

- The test is performed on a hard surface, and participants are told to jump as far as possible (horizontal direction) following standardized procedures.
- Participants starts from a standing position, with both feet touching at starting line, and are allowed to swing their arms before the jump.
- Both the take-off and landing phases of the jump has to be done with both feet. The distance between take-off and the heel of the closest foot at landing is recorded in centimetres.<sup>[6]</sup>

## IX. PROCEDURE

ETHICAL CLEARANCE WILL BE OBTAINED FROM INSTITUTIONAL ETHICAL COMITEE

INTERVENTION WILL BE EXPLAINED IN VERNACULAR LANGUAGE TO THR PARTICIPANTS

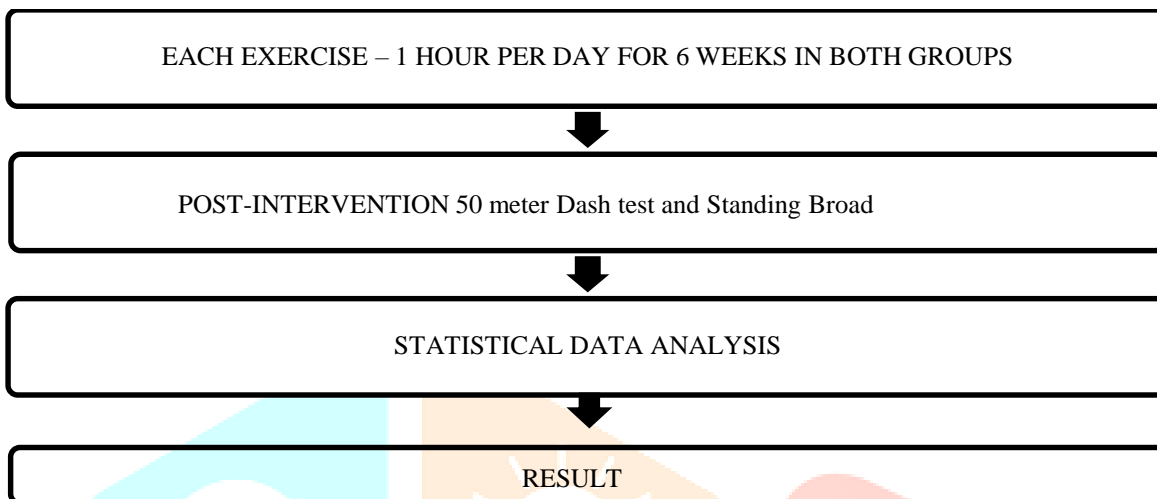
SCREENING OF INCLUSION AND EXCLUSION CRITERIA WILL BE DONE

PARTICIPANTS ARE INCLUDED AND WRITTEN CONSENT FORM IS OBTAINED

PRE-INTERVENTION assessment 50 meter Dash test and Standing Broad Jump test

PARTICIPANTS ARE RANDOMLY DIVIDED INTO GROUP A AND GROUP B

<b>GROUP A</b>	<b>GROUP B</b>
CONTROL GROUP	EXPERIMENTAL GROUP
NORMAL ROUTINE	LADDER DRILL
6 WEEKS	6 WEEKS



Ethical clearance will be obtained from the Institutional Ethical Committee. Subjects will be selected according to the inclusion and exclusion criteria. Prior to the study subjects were explained the procedure in vernacular language. A written informed consent was taken from the subjects prior to the intervention. The subjects were allotted into 2 groups randomly 33 in each group, Group A: Control Group and Group B: Experimental Group. Pre and Post intervention speed and explosive Power were measured and recorded using 50meter dash test and Standing Broad Jump. Group B subjects were asked to perform ladder drills for 1 hour/day for a period of 6weeks.

**Table 1: Normal routine**

<b>NORMAL ROUTINE</b>
Fast Jogging-2rounds(100m)
Leg 90-90 stretch(2×20sec)
½ leg kneeling lunge each leg(2×20sec)
Horizontal squat hold(2×20sec)
Hamstring floss(2×20sec)
Knee rolls(2×20sec)
Russian twist (3×20sec)

**Table 2: Ladder Drill programme**6 weeks of ladder training was given to experimental group.<sup>7</sup>

Week	Training programme	Complexity of Drill	Number of sets	Rest between sets	intensity of drill
Week 1 and 2	Straight run	Easy	3 set	2min	Fast
	Two foot run				
	Bunny hops				
	Slalom jumps	Easy	3 set	2min	Fast
	Bunny twist				
	Lateral run				
	Straight skip				

Week 3 and 4	Side reach run	Moderate	3sets	2min	Fast
	Bunny twist				
	Brake run				
	Lateral run				
	Two in , two out forward run(hop scotch)	Moderate	3sets	2min	Fast
	Two in , two out lateral run				
	In and out bunny hops				

Week 5 and 6	Bunny hops	Hard	3set	2min	Fast
	Skip out				
	Side step run(Icky shuffle)				
	Crazy bunny				
	Out, out in with hip rotation	Hard	3set	2min	Fast
	Brake run				
	Carioca step				

Figure5,6,7,8: subjects performing ladder drills

Figure 5



Figure 6



Figure 7



Figure 8



### X. STATISTICAL ANALYSIS

Data will be collected and statistically analysed by-

Group A pre and post 'paired t- test'

Group B pre and post 'paired t- test'

Group A and Group B – 'unpaired t – test'



## XI. RESULTS

**Table 3: Within group Pre and post paired sample t test for Group A**

Variable	Pre		Post		Diff		Effect size	t-value	p-value
	Mean	SD	Mean	SD	Mean	SD			
50 METER DASH TEST	7.6873	0.477	7.6876	0.478	0.0003	0.02	0.01	0.061	0.952
STANDING BROAD JUMP	212.42	18.10	212.52	17.89	0.10	1.58	0.06	0.329	0.744

The 50 METER DASH TEST mean value indicated changes post treatment and higher values are recorded for post treatment outcome and also the standard deviation shows the limited consistency with post treatment value which is more than pre value.

The effect size or Cohen's D indicates 0.01 value which is assumed to be very low in effect size as per the standard parameters of reference.

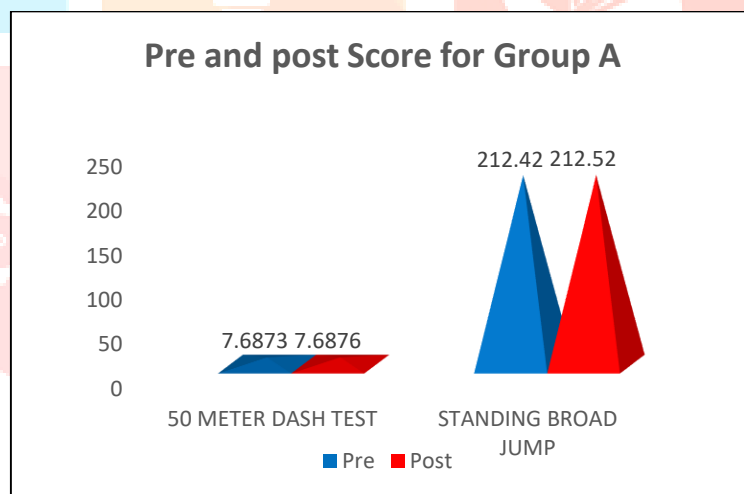
Based on the results of the test analysis at 5% significance level, there is a non-significant statistical reliable difference between the pre & post treatment values with p-value is more than the 5% significance level (i.e.  $0.952 > 0.05$ ) in the study and therefore it justifies the partial improvements in health outcome post intervention.

The STANDING BROAD JUMP mean value indicated changes post treatment and higher values are recorded for post treatment outcome and also the standard deviation shows the consistency with post treatment value which is less than pre value.

The effect size or Cohen's D indicates 0.06 value which is assumed to be very low in effect size as per the standard parameters of reference.

Based on the results of the test analysis at 5% significance level, there is a non-significant statistical reliable difference between the pre & post treatment values with p-value is more than the 5% significance level (i.e.  $0.744 > 0.05$ ) in the study and therefore it justifies the partial improvements in health outcome post intervention.

**Graph 1: Pre and post score for Group A**



**Table 4: Within group Pre and post paired sample t test for Group B**

Variable	Pre		Post		Diff		Effect size	t-value	p-value
	Mean	SD	Mean	SD	Mean	SD			
50 METER DASH TEST	8.35	0.64	8.03	0.63	0.320	0.290	1.10	6.333	0.001*
STANDING BROAD JUMP	213.45	15.49	233.85	17.45	20.394	9.782	2.08	11.977	0.001*

The 50 METER DASH TEST mean value indicated changes post treatment and lower values are recorded for post treatment outcome and also the standard deviation shows the consistency with post treatment value which is less than pre value.

The effect size or Cohen's D indicates 1.10 value which is assumed to be very high in effect size as per the standard parameters of reference.

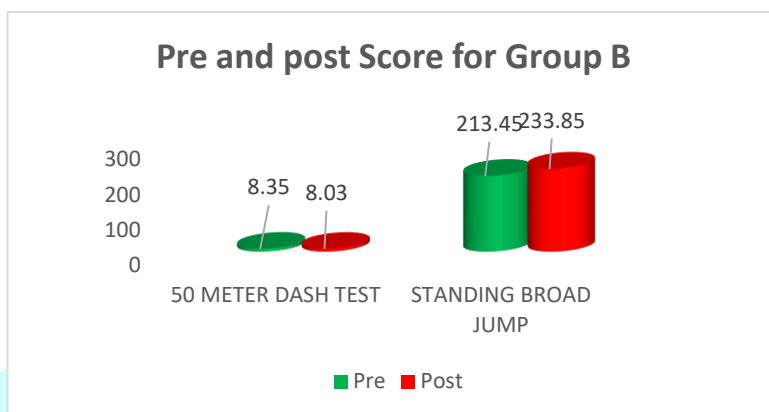
Based on the results of the test analysis at 5% significance level, there is a significant statistical reliable difference between the pre & post treatment values with p-value is less than the 5% significance level (i.e.  $0.001 < 0.05$ ) in the study and therefore it justifies the improvements in health outcome post intervention.

The STANDING BROAD JUMP mean value indicated changes post treatment and higher values are recorded for post treatment outcome and also the standard deviation shows the limited consistency with post treatment value which is more than pre value.

The effect size or Cohen's D indicates 2.08 value which is assumed to be very high in effect size as per the standard parameters of reference.

Based on the results of the test analysis at 5% significance level, there is a significant statistical reliable difference between the pre & post treatment values with p-value is less than the 5% significance level (i.e.  $0.001 < 0.05$ ) in the study and therefore it justifies the improvements in health outcome post intervention.

**Graph 2: pre and post score for Group B**



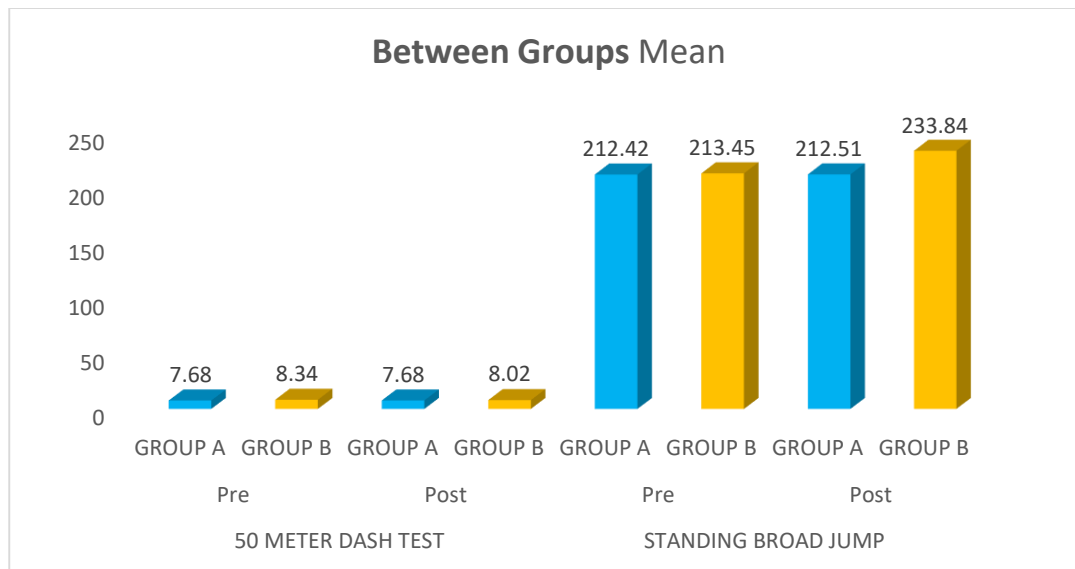
**Table 5: Between Groups independent sample t test Statistics**

Variable	Time frame	Group	Mean	SD	t value	p-value
50 METER DASH TEST	Pre	GROUP A	7.68	0.47	4.735	0.001*
		GROUP B	8.34	0.64		
	Post	GROUP A	7.68	0.47	2.487	0.016*
		GROUP B	8.02	0.62		
STANDING BROAD JUMP	Pre	GROUP A	212.42	18.09	0.249	0.805
		GROUP B	213.45	15.48		
	Post	GROUP A	212.51	17.89	4.903	0.001*
		GROUP B	233.84	17.45		

From the above table it is observed that between groups analysis is significant for 50 METER DASH TEST across both the time frames at 5% level significance. Group B with a higher value is better than the Group A

From the above table it is observed that between groups analysis is significant for STANDING BROAD JUMP at post time frames at 5% level significance. Group B with a higher value is better than the Group A

Graph 3: Between groups Mean



## XII. DISCUSSION

Cricket places a lot of physical demands on the body, including those related to muscular strength, endurance, speed, agility, and power along with sudden actions that involves both slow and quick movements, thus running speed, power and strength have emerged as crucial athletic traits for cricket players. Ladder training is a multidirectional program which helps in improving speed, agility, coordination, balance, reaction time. It involves various drills which engages subject to follow a pattern of steps to complete the drill.

**Anagha Ghosalkar,et.al(2020)** this previous study was to assess the explosive power of the players. This study also highlights that cricket is a physically intensive game format incorporating maximal sprints thus depicting the crucial demands such as running speed, explosive power.

**Castanga C,et.al(2009)** has layed emphasis on the varying role of explosive power in various sports like cricket and basketball which essential for improving their overall performance during game formats

The study hypothesize to investigate the effect of ladder training on speed and explosive power among sub-elite cricket players. The result of the study revealed that ladder training depicts that there is significant improvement in speed and explosive power which was measured by 50meter dash test and standing broad jump respectively. Training was followed for 6 weeks with a fixed protocol and fixed progression set week by week in which drills were categorized into easy, moderate, hard. The study was taken place in Crickingdom Cricket Academy, Sangli. A total of 66 players were selected according to inclusion and exclusion criteria and divided into 2 groups (A and B) with each containing 33 players. Group A was undergoing normal routine and Group B underwent ladder training. Pre and Post intervention outcome measures like 50meter dash test and Standing Broad Jump was done. This study was done for 6 weeks and statistical analysis was done of pre and post training results.

In group A, the pre and post score of speed and explosive power were not statistically significant as this group underwent normal routine whereas group B shows significant improvement in speed. **N Chandrakumar,et.al(2015)** this previous study concludes that there is significant improvement on speed due to ladder drill among college badminton players which was measured by 50 meter Run pre and post training that was scheduled for 8 weeks, this study was analysed by scheffe's post-hoc test to find out the significant paired mean difference.

**Nanda Eriko Pratama,et.al(2018)** studies show a positive effect on the increase of speed after a periodized ladder training which included drills like Hop Scotch. This study concluded that Group I which underwent ladder training has better effect than rope jump exercise to improve speed whereas rope jump exercise showed better results in terms of explosive power (leg muscle power)

In the study group B shows statistical difference in explosive power with p-value less than the 5% significance level (i.e.  $0.001 < 0.05$ ). This previous study **Mohd Waseem Jan Padder, et.al** suggests that ladder training showed improvement of 19.44% on explosive power during twelve week of training programme among school level kho-kho players.

## XII. CONCLUSION

The result of the study indicates that there is significant improvement and difference due to the impact of ladder training on speed and explosive power among sub-elite male cricket players in Sangli

## XIV. LIMITATIONS AND SUGGESTIONS

### Limitations:

- The research could not include subjects of age group less than 17 years and more than 28 years old.
- The study results were related only to male sub-elite players.

### Suggestions:

- Further research can focus on following a training protocol of more than 6 weeks.
- Study can be done on larger population

## XV. ACKNOWLEDGMENT

We acknowledge our Principal, Staff and all the participants of Crickingdom Sports Academy, Sangli to be part of the research, for their tremendous support and also to the authors whose publications are cited and used in references to this paper.

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