

## RESEARCH ARTICLE

## COMPARISON OF INJURY PREVENTION PROGRAM ON PHYSICAL FITNESS AMONG CRICKETERS IN WARM-UP AND COOL-DOWN PHASES

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## ABSTRACT

**Background:** Cricket is considered 2nd most famous sports while the chances of injuries are very high. Proper warm-up, cool down exercises play important role in reduction of injuries and cricket injury prevention program may be effective in warm-up or cool-down phases of training. **Objective:** To compare the effects of injury prevention program on physical fitness among cricketers in warm-up and cool-down phases. **Methods:** A Randomized Clinical Trial (NCT04017715) was conducted at Rawalpindi cricket club. Subjects were recruited through purposive sampling. The inclusion criteria were athletes registered with Pakistan Cricket Board, age 16-30 years and attending minimum 3 sessions were week. The n=55 subjects were recruited and randomly divided into three groups by sealed and envelop method. Cricket Injury Prevention Program introduced in warm-up and cool-down phases in Group A (n=18) and B (n=20) respectively and group C (n=17) is considered as control group for 6 weeks. Assessment were taken through 100m sprint, Burpee test, Illinois Agility Run test, plank test and star excursion balance test at baseline and after 6 weeks of intervention. Data analysis was done through SPSS 25. **Results:** The mean age of the subjects was 19.31±2.79, mean Body Mass Index was 18.77±1.58. There is a significant difference among all groups in 100m sprint, T agility, plank test, 3 minutes burpee test and start excursion test (p value<0.05). **Conclusion:** Cricket injury prevention program (CIPP) is effective in preventing injuries in cricketers in both warm up and cool down.

**Keywords:** Athletics performance, Cricket sport, Cool-down exercises, Warm-up exercises.

## INTRODUCTION

Cricket is internationally recognized non-contact sports played in 105 countries who are members of International Cricket Council.<sup>1</sup> Cricket is ranked as worlds second most popular and sought after game following football.<sup>2</sup> Chest injuries, cardiac arrest and head injuries are very common in cricket sports and twelve international cricket players died due to these injuries in last 3 decades.<sup>3</sup> A recent study was conducted in professional cricket players that concluded that musculo-skeletal injuries such as low back pain, upper back and extremity injuries are common in cricket.<sup>4</sup>

In current time, International athletes are anticipated to commence their long hard training very early in their life to shine in their choice of sport. The common cause of injury in cricket players happen during the time of ground contact and follow through phase in bowlers especially. The condition of the ground specifically on the bowler ends and exercises to prevent the injuries are considered effective in reduction of injuries in cricket players.<sup>5</sup> Researches show that most of the injuries happen during season.<sup>6</sup> Any physical impairment that took place in game, preparation or coaching sitting and which barred the player from

ending that particular game, practices or training sessions.<sup>7</sup> According to Stretch & Venter 66% of overall reported injuries fall in serious category, while chronic and acute-on-chronic made up 12% and 22%, respectively in south Africa cricketers. Where reported Soft-tissue injuries were primarily muscle related injuries constituting up to 41%.<sup>7</sup> According to Dillion the rate of injury to the head, neck, and face ranged from 5.4% to 25%, while upper limbs were ranging from 19.8% to 34.1%. Back and trunk injuries ranged from 18.0% to 33.3%, and lower-limb injuries ranged from 22.8% to 50.0% Maximum were first time injuries; episodic injuries from prior season ranged 23.9% to 29.8%, and injuries which were sustained in the season repeated again during the same season ranged from 22.7% to 36.8. Dhillon et al., in their research also report that 62.5% injuries were bad enough to inhibit cricketers for more than 4 weeks from cricketing activities.<sup>8</sup>

Many cricket regulating bodies working aggressively in managing the injury in cricket players. In lower extremity, groin, hamstring strain, knee and ankle injuries are very common especially in bowlers.<sup>9-11</sup> There are different strategies used in cricket to prevent injuries in cricket players such

as eccentric strengthening exercises and isometrics are recommended to prevent injuries of groin,<sup>12</sup> lower extremity proprioception exercises and strengthening exercises are recommended to prevent hamstring injuries,<sup>13</sup> and plyometric exercises are recommended to prevent injuries of knee and ankle.<sup>14</sup> FIFA 11+ is considered strongly related to injury prevention program in sports that concluded that it can decrease the chances of injury up to 35%.<sup>15</sup> A meta-analysis conducted by the soomro et al that concluded that Injury Prevention Program is an effective strategy in reduction of injury up to 32%.<sup>16</sup> There are very few studies conducted yet that work on the injury prevention program in cricket players while there is no study conducted yet that cricket injury prevention program in warm-up phase or cool-down phase of training.

## METHODOLOGY

The registered randomized clinical trial conducted in cricket clubs (NCT04017715). The non-probability purposive sampling technique used and randomization of subjects were done sealed and envelop method. Sample size of 55 male athletes participated in the study that having age between

16 to 30yrs, registered players with Pakistan Cricket Board (PCB) and Players attending minimum three sessions per week.

A Total of n=65 players were screened for this study. 3 participants were excluded due to not meeting inclusion criteria while n=2 participants declined to participate. There were total n=60 participants those were randomly divided into Group A (Warm up n=20), Group B (Cool down n=20) and Group C (Control n=20) through sealed and envelop method. 2 players from group A (Warm-up) and 3 players from the Group C (Control) group were drop out and did not continue the protocol.

Data was collected through self-structured questionnaire that includes demographics data and pre-post data of every participant. Battery of exercise run to check the performance of athlete that includes 100m sprint, Burpee test, Illinois Agility run test, plank test and star excursion test. Assessment was taken at zero week before the start of intervention and after 6<sup>th</sup> week of intervention. The Cricket Injury Prevention Program was introduced in group A and Group B for the duration of 6 weeks.

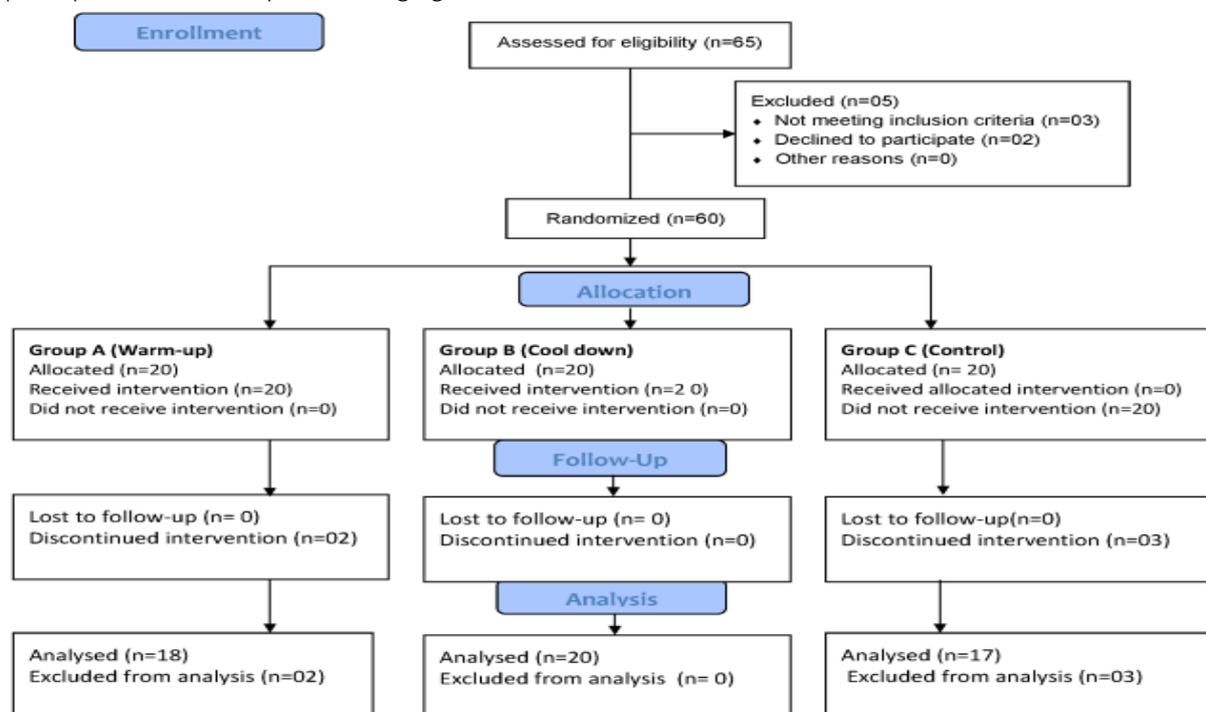


Figure 1: CONSORT diagram

The Sphiro-wilk test showed normal distribution of data paired T-Test used for pre and post change in

the dependent variable, while MANOVA with univariate analysis was used for group comparison.

Data were analysed with SPSS version 25 while setting the level of significance at  $p < 0.05$ .

**Table 1 Cricket Injury Prevention Program (CIPP)**

	Exercises	Description	Repetition
Phase 1 (Stretching and running)	Jogging,	Jog with ease up to 20m	1
	Walking lunge and sweeps,	1 lunge with regular walk	1
	Hip in and out running	1 lunge with cricket bat up to 20m	2
Phase 2 (Strength and agility)	Squat	Partial squat followed by standing straight and then stand on the toes	1x6 reps
	Push-ups	Push up with wide palmer position	1x6 reps
	Vertical Jumps	Partial squat followed by jump upward	1x6 reps
	Lateral Jumps	One leg standing and side to side jump with alteration of foot	1x6 reps
	Nordic hamstring	Kneel down in prone position with partner up and hold the ankle	1x6 reps
	Shoulder external rotations	Elbow flexion and shoulder abduction up to 90 degree and add rotation with holding bat	1x6 reps
	Modified Ankle discs	Balance on cricket ball under each foot	1 minute
Phase 3 (Balance & core muscle strength)	Planks	Forward planks	2x30 s
	Side planks	Side planks on both sides	1x20s
	Bird dog	Go on fours, lift opposite arm/leg for both sides	3x10s
	3 run sprint	Running between wicket that is 20 meter with full speed	1 rep

## RESULTS

The subject who completed the study was  $n=55$ . The mean age  $\pm$  SD of the population was  $19.3 \pm 2.79$  years, weight was  $61.85 \pm 5.21$  kg, height was  $67.69 \pm 3.25$  inches and mean  $\pm$ SD of BMI was  $19.54 \pm 1.07$  kg/m<sup>2</sup>. Figure 2 shows injuries occurrence in cricket players that shows that no injury occur in sports activity during the training program in warm-up and control group while 3 injuries reports in control group (Figure 2).

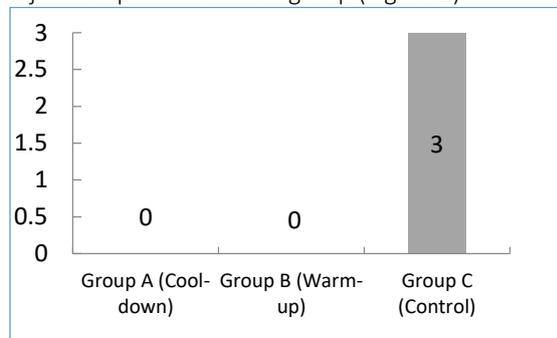


Figure 2: shows occurrence of injury in players

With-group analysis showed that all variable significantly improved ( $p < 0.001$ ) after 6 week of intervention in all group. But in control group start excursion test did not show significant ( $p=0.135$ ) improvement.

The One way MANOVA results showed that There was a statistically significant difference in interventions based on a Physical fitness components with large effect size  $F(10,96) = 7.10$ ,  $p < .0001$ ; Wilk's  $\Lambda = 0.330$ , partial  $\eta^2 = .42$ . The One Way ANOVA showed there was statistically significant difference among the groups after 6 week of intervention. The post hoc tucky HSD test showed that warm-up group more significantly improve in 100m run test ( $p=0.012$ ), as compare to control group but no significant difference ( $p=0.07$ ) between warm-up and cool down group.

**Table 2 within group changes in Physical Fitness components**

Variable		Warm-up (n=18)			Cool down (n=20)			Control (n=17)		
		Mean	SD	p-value	Mean	SD	P-value	Mean	SD	P-value
100m Run Test	Pre	8.91	1.86	0.000***	9.84	2.00	0.000***	7.88	1.27	0.000***
	Post	5.32	1.79		6.59	2.03		7.06	1.21	
T-Agility Run Test	Pre	13.16	1.32	0.000***	13.6	0.94	0.000***	12.82	1.07	0.000***
	Post	10.28	1.32		11.0	1.56		12.38	0.82	
Plank test	Pre	18.61	4.19	0.000***	18.75	3.62	0.000***	17.91	2.45	0.000***
	Post	25.33	2.72		25.30	4.11		19.5	2.20	
3 minutes Burpee test	Pre	16.67	2.00	0.000***	16.60	2.01	0.000***	16.23	1.89	0.000***
	Post	23.89	3.14		21.15	3.09		17.17	1.97	
Star excursion balance test	Pre	33.00	1.68	0.000***	32.60	1.50	0.000***	32.29	1.96	0.135
	Post	25.78	3.29		27.70	3.19		31.65	2.66	

Significance level:  $p < 0.05^*$ ,  $p < 0.01^{**}$ ,  $p < 0.001^{***}$

The T agility run test was also showed better result in warm-up ( $p < 0.001$ ) and cool down group

( $p=0.008$ ) as compared to control group, but no significant difference ( $p=0.169$ ) between warm up and cool down groups. The warm up ( $p < 0.001$ ) and

cool down group ( $p < 0.001$ ) showed statistically significant improvement as compare to control group in plank test, while comparing the warm and cool down group no significant difference ( $p = 0.999$ ) observed. The warm up ( $p < 0.001$ ) and cool down group ( $p = 0.012$ ) showed significant improvement in 3 minutes burped test while

comparing with control group. While comparing the groups, the warm ( $p < 0.001$ ) and cool down group ( $p = 0.001$ ) both significantly improved in start excursion test score as compare to control group, but no statistical difference ( $p = 0.142$ ) between these two groups. (table 3)

**Table 3: Between the group comparison of Physical fitness component**

Variable	Warm-up (n=18)		Cool down (n=20)		Control (n=17)		F((2,52)	Sig	$\eta^2$
	Mean	SD	Mean	SD	Mean	SD			
100m Run Test (sec)	5.32	1.79	6.59	2.03	7.06	1.21	4.804	.012*	.156
T-Agility Run Test	10.28	1.32	11.0	1.56	12.38	0.82	11.766	0.000***	.312
Plank test	25.33	2.72	25.30	4.11	19.5	2.20	19.035	0.000***	.423
3 minutes Burpee test	23.89	3.14	21.15	3.09	17.17	1.97	25.029	0.000***	.490
Star excursion balance test	25.78	3.29	27.70	3.19	31.65	2.66	16.523	0.000***	.389

Significance level:  $p < 0.05$ \*,  $p < 0.01$ \*\*,  $p < 0.001$ \*\*\*

## DISCUSSION

The current study was conducted to evaluate the effect of Cricket Injury Prevention Program on warm up and cool-down phase of training in cricket. The protocol was introduced to players for 6 weeks. Results showed significant improvement in 100m sprint in players who had taken cricket injury prevention program as warm-up ( $p < 0.001$ ). A standard protocol of injury prevention program was introduced by Soomro et al in 2017 that concluded that it is similar with the FIFA 11+ protocol for injury prevention program.<sup>17</sup> There is no study conducted yet to compare cricket injury prevention program in warm-up and cool-down phases of training while one of the study is still in phase of trial in Australia on larger scale to compare injury prevention program in warm-up and cool-down phases.<sup>17</sup>

A study conducted to determine the effect of FIFA 11+ on injury prevention at community level and concluded that it is effective intervention in reduction of injuries in warm-up phases of training.<sup>18</sup> All sports association is now moving toward sports specialized injury prevention program. Ayala et al conducted a RCT of 16 players and some component of injury prevention program were used as intervention protocol was given for 3 weeks, which showed significant improvement in 100m sprint in warm up plan.<sup>19</sup> Strength of the players was assessed by using burpee test in present study. It showed statistically significant improvement in strength of players of both warm up and cool down groups at the end of 6 week with mean and standard deviation was  $23.89 \pm 3.14$  and

$21.15 \pm 3.09$  ( $P$  value = 0.001). In current study agility was assessed using T-agility test. Results at the end of 6th week protocol showed improvement in both groups warm up and cool down. Jeremy.J et al conducted a 6 week study and results of this study showed significant improvement agility of players and decreased in time of agility test.<sup>20</sup>

To assess the control and endurance of back muscle plank exercise was done in this study. Results showed increase in time of plank and increase in endurance of back muscles. Tom.k et al conducted study, 28 men and 8 women were included and the findings of the study suggest that the sport-specific endurance plank test is a valid, reliable and practical method to assess global core muscle endurance in athletes.<sup>21</sup>

In the current study warm up plan was effective in preventing the overall injuries in players. Jiri Dvorak et al conducted a RCT the results showed that risk of severe injuries, overuse injuries was reduced.<sup>22</sup> In this study evaluation of dynamic balance of lower limb was done by star excursion balance test. It was effective in cool down and warm up group. Alyson Filipa et al conducted a study on effectiveness of SEBT.<sup>23</sup> Core stability is one of the important factors for athletes. In this study core stability exercises were administered to improve overall fitness and to prevent injuries. Results showed significant improvement in overall fitness of players and in preventing injuries. Literature supported results of this study by another study conducted by Akuthota et al which suggest significant improvement in overall fitness of athletes which ultimately prevents injuries.<sup>24</sup> In current study different exercises plank, side planks,

pushups were used for 6 weeks. These exercises improved the core muscle strength. Another study was conducted for 6 weeks by Simone Araujo et al. It was a pilot study on core stability training. Results of the study suggest significant improvement in core muscles strength.<sup>25</sup>

## CONCLUSION

Cricket injury prevention program (CIPP) is effective in preventing injuries in cricketers in both warm up and cool down and safer as compared to traditional protocol but it would be more effective in warm-up phase of training as compared to cool-down phase.

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