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Effect of CricFit intervention program on throwing and running performance in non elite adolescent cricket players

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Abstract
Background: Cricket is the most popular sport in India. In cricket, the majorities of injuries are of a non-contact nature and have traditionally been thought of as "overuse" injuries. The CricFit intervention is focused on aspects such agility, strength, power, endurance, speed, flexibility, repeat sprint ability, injury prevention and performance and improve the cricket-specific physical fitness and performance of cricket players.
Objective: To determine the effect of CricFit Intervention program on throwing and running performance in non- elite Adolescent Cricketers.
Method: 40 Non-elite male adolescent cricket players within age group 19-24 randomly assigned and baseline variables were recorded pre and post. CricFit intervention program 35-45 min per session is given. The intervention also incorporated a dynamic warm-up and a static cool-down. Pre and post intervention, the parameter assessed by using functional throwing performance index (FTPI), radar gun, 17.68-m with bat sprint cricket speed test.
Results: The CricFit intervention program in pre test the Mean and SD of FTPI was 52.90±15.28, which was decreased in post test with Mean and SD 53.63±10.16. The Wilcoxon test for pre and post test were no significant at (p> 0.05). In pre test the Mean and SD of Radar Gun was 101.33±7.68, which was increased in post test with Mean and SD of 104.53±8.08, the t–test for pre and post score were significant at (p< 0.001). In pre test the Mean and SD of 17.68-m with bat sprint cricket speed test 3.21±0.22, which was reduced in post test with Mean and SD of 2.73±0.46, the t-test for pre and post test score were significant at (p< 0.001).
Conclusion: It evidenced that CricFit intervention program was statistically significantly improved the throwing speed and running performance among the non elite adolescent cricket player but no statistically significant differences was seen in throwing accuracy.

Keywords: CricFit, performance, speed, accuracy

Introduction
Cricket is India's most popular sport, and it is gaining popularity in all of Southeast Asia. Due to increased playing hours and performance expectations, cricketers have been put under more strain in recent decades as a result of the sport's expansion. Despite the fact that cricket is a non-contact sport, players participate in a wide range of physical activity such as running, throwing, batting, bowling, catching, jumping, and diving, which leads to overuse and impact injuries [1]. The majority of injuries in cricket is non-contact and have traditionally been regarded as "overuse" ailments. Although the proportional contributions of change of workload and absolute workload differ depending on injury type, there is accumulating evidence that rapid change in workload is a bigger risk factor for many injuries than absolute workload per second [2]. In 2005, England, South Africa, Australia, the West Indies, and India were among the first sports to publish suggested injury surveillance systems. While the number of injuries has remained relatively constant, the occurrence of injuries has increased as a result of game format modifications, an increase in the number of matches played, and a decrease in the amount of time between matches. The most common sports injuries are bowling (41.3%), fielding (28.6%), and wicket keeping (28.6%). Acute injuries are the most common (64 percent to 76 percent), followed by acute-on-chronic (16 percent to 22.8%), and chronic injuries (16 percent to 22.8%). (8% -22%) [3].

At the non-elite levels of play, the volume of literature on the epidemiology, causation, and prevention of cricket injuries is sparse, as evidenced by a report from a study on the nature of injuries among schoolboy cricketers conducted over ten years ago. Injury rates among these schoolboy cricketers were reported to be 49.0 percent throughout the season. Younger cricketers were shown to be more likely than their older counterparts to develop an injury and have that injury repeat during the season or the next season. In a research of senior provincial cricketers, it was discovered that 19-24 year old cricketers were more prone to injury than their older counterparts, with 46 percent of injuries sustained over the course of a four-season study [4].

When a throw of maximum or near maximum throwing velocity is required, overhead throwing, rather than side arm or underarm throwing, is typically chosen as the best throwing approach. Implement velocity and accuracy are two release components of throwing performance that both contribute to effective performance to varied degrees depending on the demands of the sport in question. The time it takes for the ball to be returned to the stumps from the field in cricket is influenced by the ball velocity and accuracy. As a result, increasing velocity reduces flight time, enhancing the fielding side's ability to perform run-outs and reducing the opposition's run-scoring opportunities. This is aided by good throwing accuracy [5].

Cricketers are subjected to a variety of sport-specific demands, including long-term training and practise. Cricket is a sport that necessitates repeated periods of high-velocity upper-limb action, which includes high-velocity throwing. Because high velocities are obtained during the throw, the maximum velocities obtainable in isokinetic dynamometers are utilized to assess internal and external shoulder rotation. In order to succeed in cricket, players must be able to toss the ball across the field with power and accuracy during play. In cricket, a successful throw requires a mix of good technique and accurate anthropometric measures. If workload increases are not effectively managed, they can result in predisposing variables that contribute to sports-related injuries [6].

Strength and conditioning exercises that can help you avoid throwing-related injuries and improve your throwing performance. a variety of strength and conditioning routines that can help the cricketer prepare physically for better throwing performance [7].

As a result, there is a distinction between programmes implemented at the elite and amateur levels. According to the findings, adolescent cricket players have a notable absence of strength and conditioning training. Furthermore, workloads are seldom controlled, and different athletic codes' seasons often overlap, resulting in schoolchildren participating in many sports at the same time [8].

Cricfit is a cost-effective, dependable intervention programme that can be completed by anybody without the need of any equipment or support. Although there are a variety of strength and conditioning programmes for cricketers, there is a scarcity of research on conditioning programmes for non-elite adolescent cricketers and their performance. The goal of this study is to see how effective the CricFit intervention programme is at improving throwing and running performance in non-elite adolescent cricketers.

Objectives of the study

- To determine the effect of CricFit intervention program on throwing and running performance in non- elite adolescent cricketers.

Methodology

Source of Data

- Cricket clubs in and around Bangalore.
- Padmashree group of institutions, Bangalore

Method of collection of data

- Population: Non Elite Adolescent Cricket players
- Sampling: Simple Random Sampling
- Sample size: 40
- Type of Study: Pre to Post Experimental study
- Duration of the study: 6 months

Inclusion Criteria

- Age : Age group between 19-24 years.
- Gender : Male Population
- Population : Non Elite Adolescent Cricketers.
- Subjects those who full fill the criteria of screening.
- Subjects willing to participate in the study.

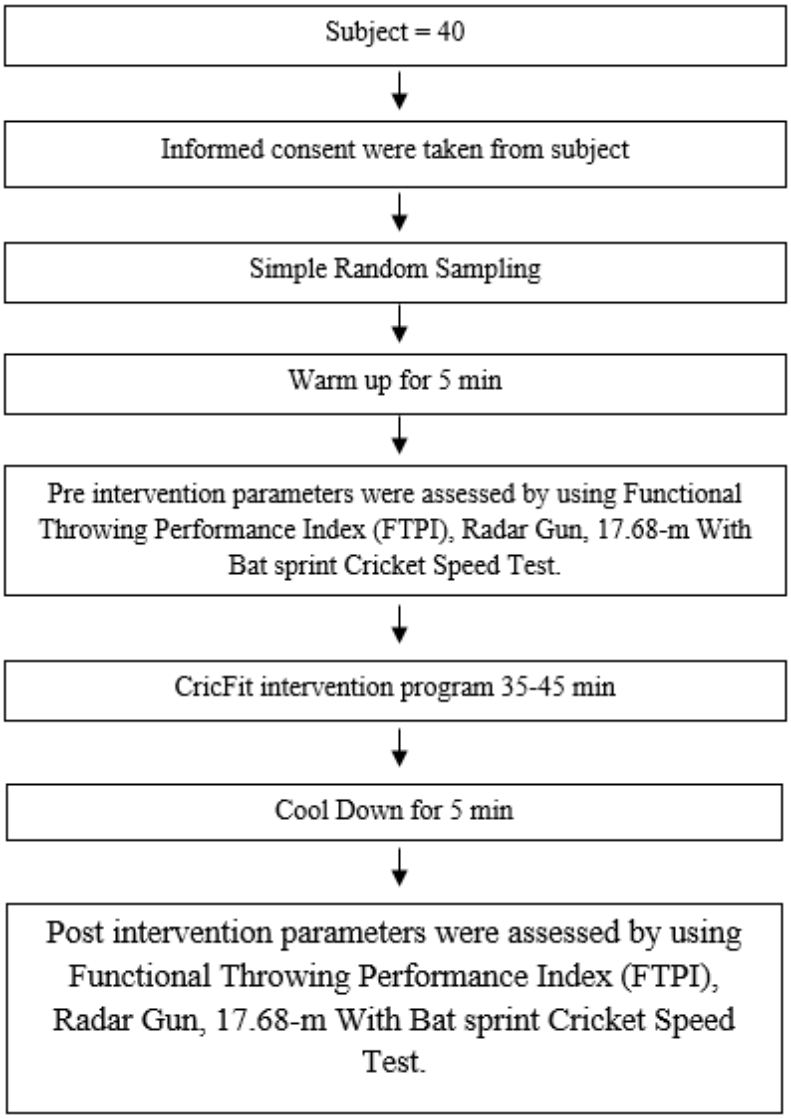
Exclusion Criteria

- Subjects presented with acute or chronic injury within the previous 3 months.
- Subjects with any conditioning program within 3 months.
- Uncooperative subjects.

Materials Required

- Medicine ball
- Agility ladders
- Skipping Rope
- Radar Gun
- Marking Cone
- Stop Watch
- Measuring Tape
- Paper and Pen
- Cricket Bat
- Cricket leather Ball

Flow chart of Methodology



Methodology

- The subjects were recruited voluntarily based on the inclusion and exclusion criteria.
- Permission was obtained from the respective institutions and informed consent was taken from the subjects to carry out the study.
- Baseline variables such as age, gender, height, weight, BMI was documented and then FTPI, radar gun, 17.68-m with bat sprint cricket speed test were recorded before and after intervention.

Procedure

The experimental group was perform a tests prior to and after completing a CricFit intervention program. The tests were perform in the order presented below. Lastly, the intervention also incorporated a dynamic warm-up and a static cool-down (5 minutes each).

CricFit Intervention program

Sprints (20 m)

Running a single maximum sprint over 20 meters, with the time recorded. Start from a stationary position, with one foot in front of the other. The front foot must be on or behind the starting line. This starting position should be held for 2 seconds prior to starting, and no rocking movements are allowed.

Plank

Lie face down in a push-up position. Keep your palms on the floor next to your shoulders and your feet flexed with the bottoms of your toes on the floor. Take a deep breath and press up into a push-up. Your body should make a straight line from your heels to the top of your head. draw your navel toward your spine and tighten your buttocks. Look at the floor to keep your head in neutral position and breathe normally.

Ladder Drill

Stand alongside the agility ladder with your chest facing the squares. Quickly jump into the ladder, landing with each foot in its own square between the rungs. Then jump backwards out of the ladder at about a 45-degree angle to your right. Next, jump immediately back into the ladder again, progressing to the right one square at a time, down the ladder.

Skipping

Place the rope behind you and turn the jump rope over your head. Catch the jump rope under your toes and lift up your heels and let it out from underneath your feet.

Lizard crawls

Starting in a high plank position, step one foot to the outside of the same side hand. Slowly lower your chest to 1-2 inches above the floor with soft pressure, slide the unloaded hand out

into full extension. Pause for a moment, breathe, feel the position. Slide the hand back in, return the foot and press up to the high plank.

Nordic lowers
Kneel on the ground—it's best if it's padded secure your feet and lower your torso to the ground as slowly as possible. Your hamstrings might feel like they want to pop out of the backs of your legs. When your hamstrings can no longer support your weight and you find yourself falling to the ground, catch yourself in a push-up position. Over time, you might actually be able to control the entire descent.

Sprints (25 m)
Running a single maximum sprint over 25 meters, with the time recorded. Start from a stationary position, with one foot in front of the other. The front foot must be on or behind the starting line. This starting position should be held for 2 seconds prior to starting, and no rocking movements are allowed.

Side plank
Start on your side with your feet together and one forearm directly below your shoulder. Contract your core and raise your hips until your body is in a straight line from head to feet. Hold the position without letting your hips drop for the allotted time for each set, then repeat on the other side.

W-sprint agility drill
Set up: 7 cones, 5 yards apart in zig-zag pattern start at cone #1. Sprint to cone #2. Plant with the outside foot. Backpedal to cone #3.sprint to cone #4. Repeat until finished with all cones. Switch starting cone and repeat in opposite direction.

Overhead medicine ball slams
Stand with feet hip width apart, knees slightly bent and hold the medicine ball with two hands directly overhead. Slam the ball to the ground in front of you as hard as you can. Catch the ball after one bounce and raise it back overhead.

Burpees
Begin in a standing position. Move into a squat position with your hands on the ground. (Count 1). Kick your feet back into a plank position, while keeping your arms extended. (Count 2). Immediately return your feet into squat position. (Count 3). Stand up from the squat position (count 4).

Squat jumps
Stand with your feet shoulder-width apart. Start by doing a regular squat, then engage your core and jump up explosively. When you land, lower your body back into the squat position to complete one rep. Land as quietly as possible, which requires control.

Outcome Measure
- Functional Throwing Performance Index (FTPI)[9 -11]
- Radar Gun
- 17.68-m with bat sprint cricket speed test.

Results

Table-1: Mean and SD of base line parameters of non-elite adolescent cricket players

S. No.	Variables	Range	Mean ± SD
1	Age (years)	19-24	20.68±1.76
2	Weight (Kg)	42-90	62.65±9.61
3	Height (Mtrs)	1.52-1.87	1.76±0.66
4	BMI	16-26	20.19±2.70

NS-Not significant. i.e., $P > 0.05$

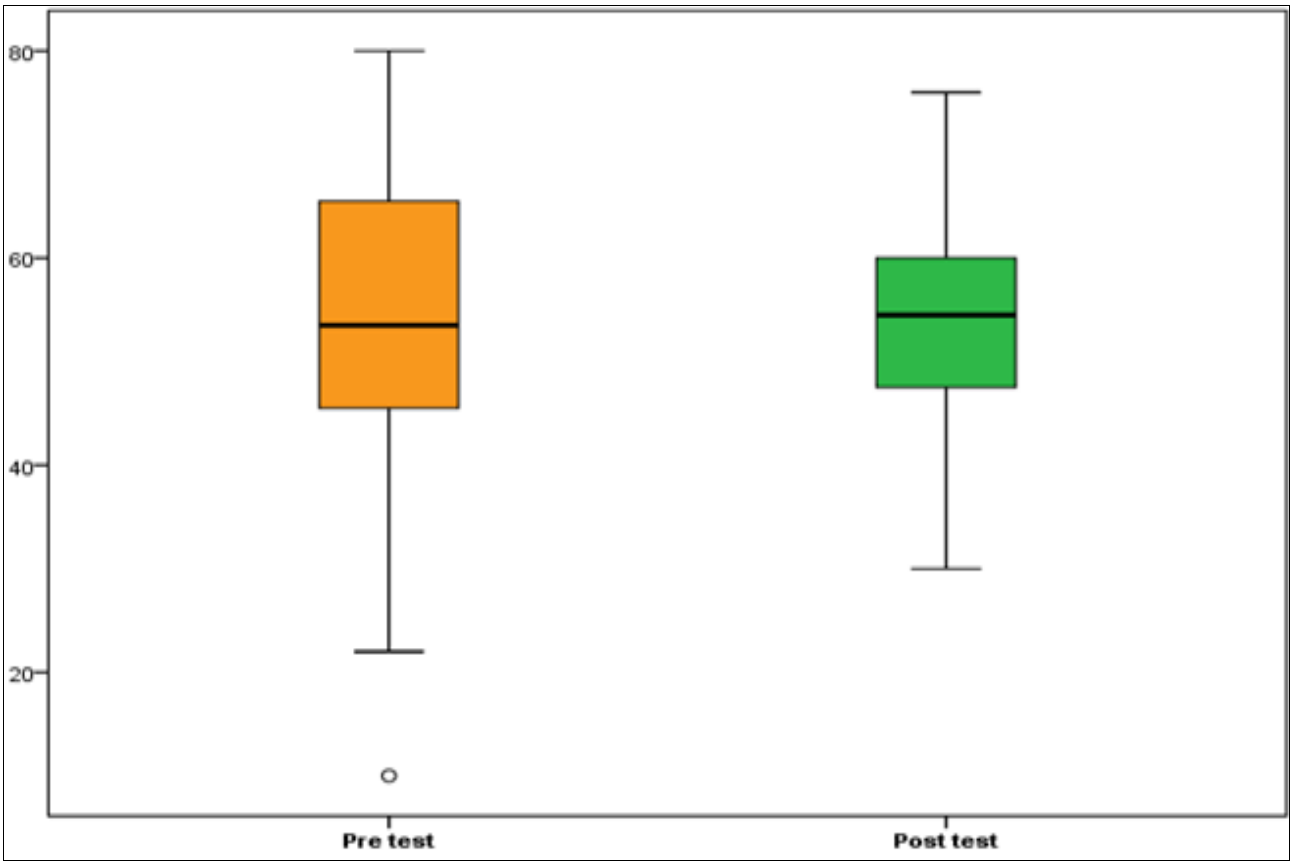
In table-1: Shows baseline parameter of non-elite adolescent cricket players age Range 19-24 Mean and SD of 20.68±1.76, weight Range 42-90 Mean ± SD 62.65±9.61, height Range of 1.52-1.87 with Mean and SD of 1.76±0.66 And BMI Range 16-26 with Mean and SD 20.19±2.70 were taken. All the baseline variables were homogenous.

Table 2: Range, Mean and SD of outcome measures of non-elite adolescent cricket players

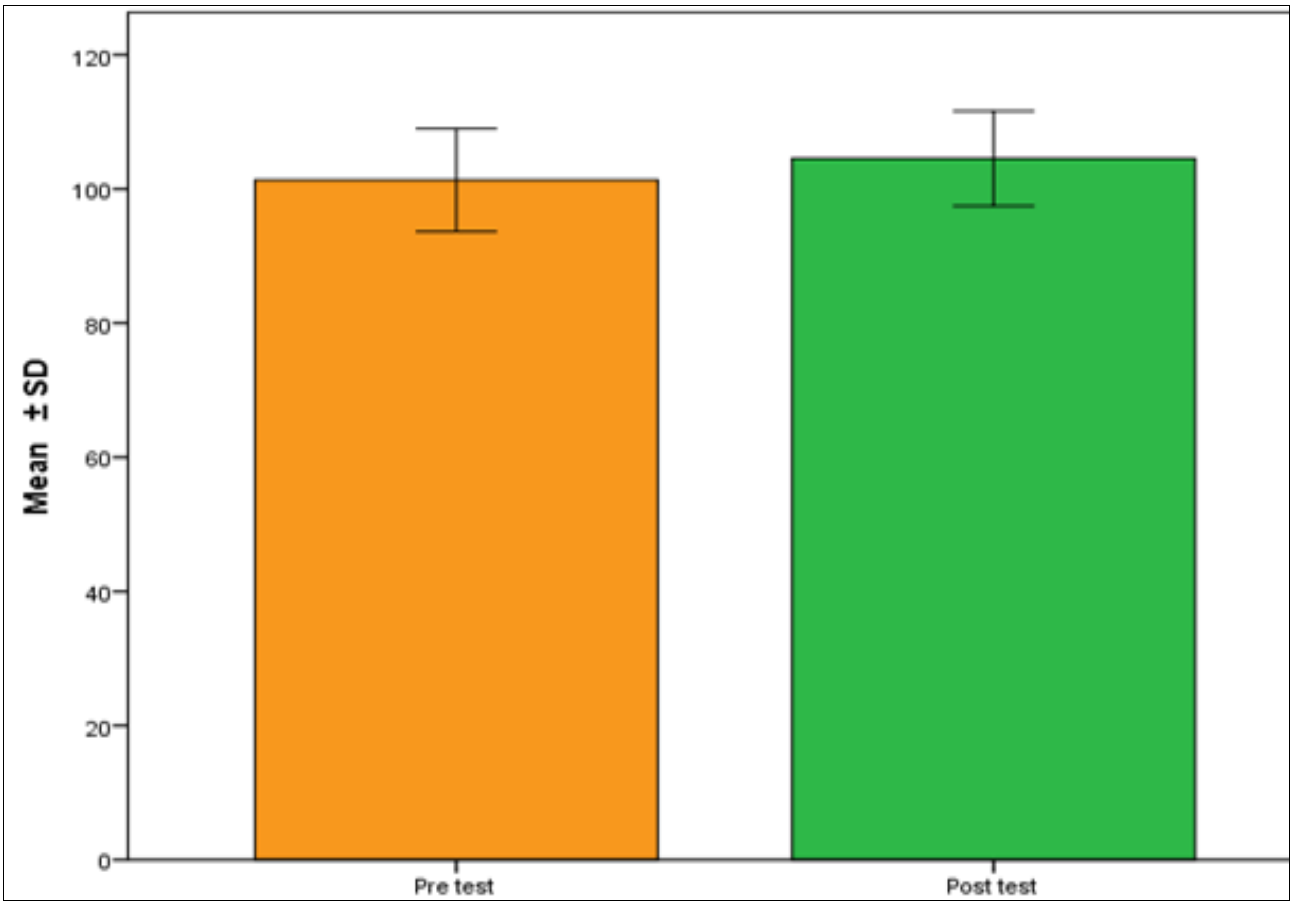
S. no	Outcome measures	Pre test		Post test		t-tet/ Wilcoxon test	p-value
		Range	Mean ±SD	Range	Mean ±SD		
1	FTPI(%)	10-80	52.90±15.28	30-76	53.63±10.16	$z=0.054^{NS}$	$p > 0.05$
2	Radar gun(m/s)	89-121	101.33±7.68	95-120	104.53±8.08	t=5.010*	$p < 0.001$
3	17.68-m with bat Sprint cricket speed Test(m/s)	2.80-4.02	3.21±0.22	2.01-3.40	2.73±0.46	t=7.746*	$p < 0.001$

Note: * denotes –Significant, ($p < 0.05$), NS-Not significant ($p > 0.05$).

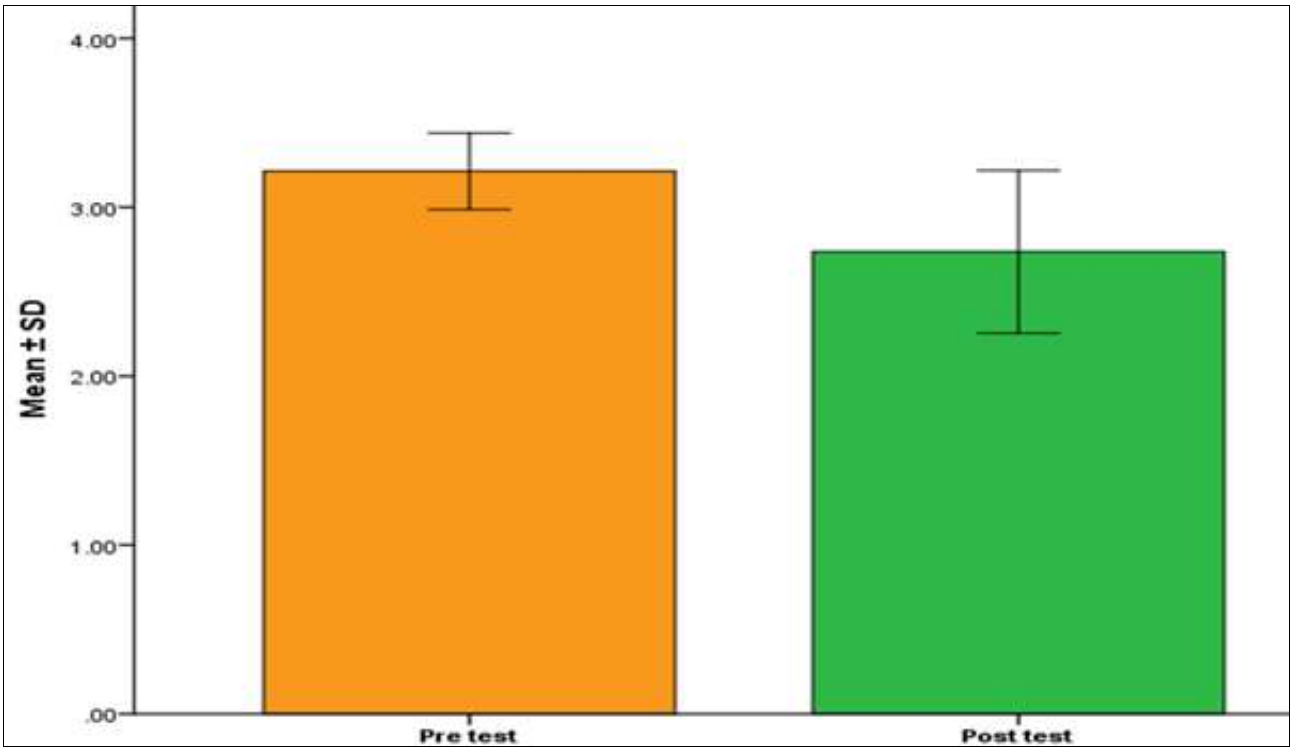
In table-2: Comparisons between pre and post- test values of FTPI, radar gun, 17.68-m with bat Sprint cricket speed test of non- elite cricket player by using t-test/ wilcoxon test demonstrate of Mean values and SD of pre and post. In pre test the Mean and SD of FTPI was 52.90±15.28, which saw increase in posttest values with Mean and SD of 53.63±10.16. the Wilcoxon test for pre and post test were not significant at ($p > 0.05$). in pre test the Mean and SD of radar gun was 101.33±7.68, which demonstrated slight increase in posttest values with Mean and SD of 104.53±8.08, the t –test for pre and post score were significant at ($p < 0.001$). In pre test the Mean and SD of bat sprint cricket speed test was 3.21±0.22, which was reduced in posttest values with Mean and SD of 2.73±0.46, the t-test for pre and post test score were significant at ($p < 0.001$)



Graph 1: Pre and Post test FTPI(%) of non elite adolescent cricket players



Graph 2: Pre and Post test Radar Gun(m/s) of non elite adolescent cricket players



Graph 3: Pre and Post 17.68-m With Bat sprint Cricket Speed Test of non elite adolescent cricket players

Discussion

The current study examines the impact of a CricFit intervention programme on non-elite adolescent cricket players' throwing and running abilities. One group of 40 non-elite adolescent cricket players was involved in this investigation. As strength and conditioning programme, the subjects were given the CricFit intervention programme. Before and after the intervention, throwing accuracy, throwing speed, and running speed were all measured. It is evidenced that CricFit intervention program was significantly improved the throwing speed and running speed performance among the non elite adolescent cricket player but no statistically significant differences was seen in throwing accuracy.

The participants in this study were divided into one group. According to table 1, the baseline data of age, weight, height, and BMI demonstrate no significant differences between the groups. The following measurements were taken: age 19-24 Mean SD 20.681.76, weight 42-90 MEAN SD 62.659.61, height 1.52-1.87 Mean SD 1.760.66 and BMI 16-26 Mean SD 20.192.70. The inclusion criteria were met by all of the participants in the study. According to NM MILSON, JG Barnard, and RA Stretch (2007), younger cricketers aged 19 to 24 were more prone to injury than their older counterparts, hence the age group preferred in this study was 19-24.

After a 5-minute warm-up, the CricFit Intervention was provided during the training session. To assess the performance of non-elite teenage cricket players after the CricFit intervention programme, before and post functional throwing performance index, radar gun test, and 17.68-m with bat sprint cricket speed test were recorded. The FTPI Score showed no statistically meaningful improvement. Pre-test scores ranged from 10-80, with a mean and SD of 52.90±15.28. It was found to be lower in the post-test, with a range of 30-76 and a mean and SD of 53.63 ± 10.16.

The Wilcoxon test was performed and determined to be non-significant with a *P*> 0.05 and a T-test / Wilcoxon test Z=0.054ns. Prior to the test, the radar gun score ranged from 89 to 121, with a mean SD of 101.33± 7.68. In the post-test, the range was 95-120, with a mean and SD of 104.5±38.08. When dependent outcomes are ordinal, the non-parametric test is used to compare them. The Wilcoxon test was used, and it was determined to be significant at P 0.001 and T-test=5.010. Prior to the test, the 17.68-m with bat sprint cricket speed test score ranged from 2.80-4.02, Mean and SD of 3.21 ±0.22, and In the post-test, the range was 2.01-3.40, with a mean SD of 2.73±0.46.

According to Jonathan Freeston *et al*., (2008), maximal efforts are accompanied by disproportionate muscle activity, which may result in a loss of control. They also claim that inefficient muscular contractions cause a reduction in ideal kinematics, resulting in decreased accuracy. This link between speed and accuracy is especially relevant in cricket, because a high-velocity throw is of little use if the increased velocity comes at the expense of precision, hence in this study, throwing speed improves while throwing accuracy declines [12]. The effects of throwing speed and running speed were shown to be beneficial. The pectoralis major and latissimus dorsi are significantly active during the arm acceleration and follow-through phases of throwing, according to EMG research by Jobe *et al*. reported that the pectorals major and latissiumusdorsi help with the throwing motion by supplying power to help the subscapularis move the arm forward across the chest.

Bowlers and batters, according to L Potei *et al*., (2020), should focus on strengthening the posterior chain, core, and mobility training (for bowlers), and upper body strength, mobility, and core work (for batsmen). This is a significant finding because prior research has shown that upper-body strength training, as well as core strengthening, is beneficial for injury prevention (especially in the lower back) and enhanced performance [13].

The results of this study were compared before and after the CricFit intervention programme, it was found that throwing velocity and running speed increased dramatically. However, there is no significant difference in throwing accuracy between the pre- and post-test values, which could be attributed to inefficient muscle contractions, which cause a

reduction in ideal kinematics, resulting in decreased accuracy. Overall, the CricFit intervention programme was found to be beneficial for non-elite adolescent cricket players in terms of throwing speed and running speed.

Limitations

- The intervention have been carried out for a short duration of 4 weeks
- The lack of awareness related to conditioning programs in non-elite adolescent cricketers.

Recommendations

1. Further research should assess whether the program can be used to prevent injuries or re-occurrence of a previous injury in players through the tracking of injury data.
2. Additionally, studies should focus on biomechanical analysis of the throwing action throughout the performance of overhead throwing.
3. The program can be further compared with other conditioning programs in sporting population.

Conclusion

CricFit intervention programme had a impact on throwing and running performance in non-elite adolescent cricketers. However, there is no significant difference in throwing accuracy between the pre- and post-test values, which could be attributed to inefficient muscle contractions, which cause a reduction in ideal kinematics.

Conflict of Interest: None

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