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Effect of Crickfit Intervention Program on Selective Fitness Variables in Amateur Batsmen: A Randomised Controlled Trial

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Abstract:

- ***Background:***

Batsman need to regularly undergo training of multiple components of fitness like strength, reaction time, explosive power and speed when players are engaged at various domestic amateur and professional level competitions. Program supplemented with batsmen specific exercises which is similar to the sports-specific activities at sufficient intensities are important for batsmen to realize greater proportional of their potentials. Crickfit intervention program implemented for 6 weeks including the strength, Upper limb explosive power and reaction time which are important fitness variables in batsmen may have significant improvement in the required specific skills and performance of amateur batsmen. Hence the aim of the study was to find the effect of the crickfit intervention program over conventional exercise on selective fitness variables in amateur batsmen.

- ***Methodology:***

After the ethical clearance from the IEC, CTRI registration of the trial was done. 47 Amateur Batsmen were screened and 40 were selected as per the eligibility criteria. After obtaining their consent, they were randomised into Group A(n=20) and Group B(n=20) by computer generated randomisation method. Further allocation was done by SNOSE method, Group A received the Crickfit intervention program, 3 sessions per week for 6 weeks. Group B continued their regular exercise program.

- ***Result and Data analysis:***

Shapiro-Wilk test indicated that data were normally distributed ($p<0.05$). A parametric test was done to analyse the normally distributed data. Significant difference was found in the experimental group when compared with the conventional group in terms of Reaction time ($p=0.008$), Explosive power ($p<0.001$), and Sprint performance ($p<0.001$) at week 6.

- ***Conclusion:***

Crickfit intervention program, when implemented for 6 weeks, has shown improvement in Reaction time, Sprint performance and Explosive Power of Upper Limb. Therefore, it is recommended to introduce Crickfit Intervention Program in regular exercise protocol.

Keywords: *CRICKFIT, Sprint Performance, Explosive Power, Reaction Time, Training Intervention, Plyometrics, SNOSE.*

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I. INTRODUCTION

Cricket has changed from being a traditional and conservative sport to a professional one that demands extremely high levels of ability and athleticism.[1] Cricket is a popular and widely followed sport played between two teams, each consisting of 11 players.[2] Even though cricket is one of the oldest organized sports, there are very few studies on the physical demands of the game. Batting and bowling are intermittent in nature, with the demands placed on the players being dictated by the type of match being played.[3]

The competition format (T20, one-day, or multi-day cricket) and the players' on-field position determine the

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physical demands of cricket. Performance indices such as total distance covered, high-speed running and the number of accelerations and decelerations are typically lower for shorter formats, whilst longer multi-day matches are more physically demanding. Performing maximal sprints as you approach a bowling delivery and running between the wickets to get runs are the characteristics of the batsmen. For batters, the capacity to execute and recuperate from repeated high-intensity attempts is crucial. The focus of this study is specifically on batters, even though fielding is a crucial cricket job for all parties, requiring significant aerobic and anaerobic endurance as well as the physical capacity to execute forceful multidirectional movements.[4]

Visual anticipation is well established as crucial for successful performance in high-speed striking sports skills such as baseball and cricket batting. This is because extreme time constraints are created when a bowler delivers a ball at high velocity, limiting the batsman's time to use information from ball flight alone to prepare and execute a stroke.[5]

Muscle strength and power are important factors and overall performance is improved due to their direct influence on kinetic chain efficiency and stroke mechanics. Research indicates that greater muscle strength enhances the ability to generate force quickly, which is essential for the explosive movements required in a powerful stroke. Among the various strength and power training methods available, plyometric training is particularly interesting because it can be performed in diverse settings without the need for substantial equipment. Research has established that plyometric training significantly contributes to positive adaptations in muscle strength and power across different sports, making it a valuable tool for athletes looking to enhance their performance.[6]

The Crickfit Intervention Program is a methodical training program created to improve players' performance and fitness for cricket, especially amateur batsmen. It focuses on enhancing important physical characteristics required for the sport, such as speed and sprinting, explosive power and reaction time. The program typically involves a combination of resistance training, plyometrics, reaction drills, sprint training, and cricket-specific exercises over a set duration. The effectiveness of the intervention is measured using tests such as sprint tests, medicine ball throws, and ruler drop tests to evaluate improvements in fitness variables.

II. MATERIALS AND METHODS

- *Design*

A randomized control trial was carried out; participants were divided into 2 groups. It was single blinded study (Participants involved in the group were blinded). The study began after the Ethical Clearance from the Institutional Ethical Committee. The IEC no is **DR. APJAKCOPT/MPT/PG/2024/21**. The study was guided by the principles outlined in the Decleration of Helsinki to ensure the protection and dignity of all human participants. Clinical Trials Registry-India (CTRI) registration is done. The CTRI registration no is **CTRI/2024/02/062909. Study Setting** The study was conducted at PMT Sports Ground, Pravara Institute of Medical Sciences (DU), Loni, Ahilyanagar, Maharashtra.

- *Study Duration*

2 Years.

- *Sample size calculation*

Sample size was calculated using open Epi software, with 99% confidence interval and a power of 90%. Grounded on the above-mentioned assumptions, the sample size needed for this study was 40 participants.

- *Participant recruitment*

All participants were asked to deeply read the study procedures and sign a detailed consent from before starting study procedures. Amateur Batsmen both male and female of age 18-24 years who were willing to participate and fulfilling PARQ+ Questionnaire. The Athletes suffering from any type of acute and severe systemic illness, any recent surgical and medical history, psychologically unstable participants, participants undergoing personal training methods, participants taking medications which affect the performance were excluded.

- *Randomization Allocation*

The courts obtained from randomization were maintained in opaque sealed envelope until the intervention begin. The allocation was concealed by a Sequentially numbered, opaque, sealed envelope (SNOSE).

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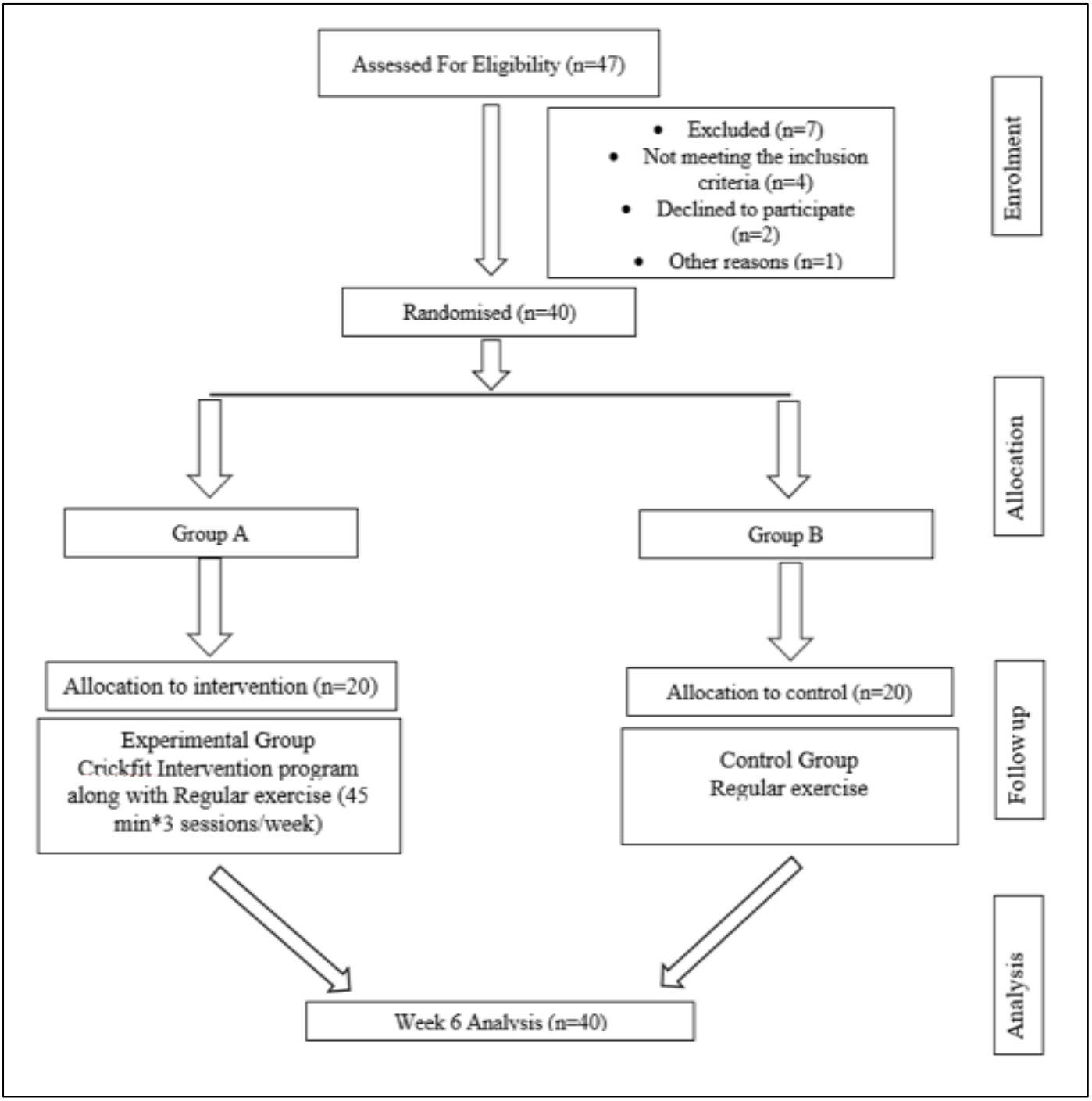

Fig 1 Design and flow of participants through the trial

➢ *Procedure*

The intervention was provided over 6 period (three sessions per week). The intervention group performed Crickfit Intervention program, while the control group continued with the regular training. The sessions were held on Monday, Wednesday, and Friday. Both the groups were assessed at different time interval, baseline at week 0 and post assessment was carried out at week 6. Before the intervention protocols, demographic data were collected.

➢ *Statistical Analysis*

Results were analysed basis of data obtained pre and post intervention using IBM Statistical Product and Service Solution (SPSS) version 28.0. Descriptive statistics for all outcome measures expressed as means, standard deviations and test significance such as paired t test used to compare data within each group and unpaired t test for comparing the data between groups. Confidence interval was set at 95%. Total of 47 participants were screened in which 40 met inclusion criteria. participants were divided into two groups. Group A (n=20) received Crickfit intervention training program with regular exercises and Group B (n=20) continued with their regular exercises

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Table 1 Crickfit Intervention Program (Experimental group Exercise)

Warm-up (5 min)	**Light jog, Glutes kicks, side shuffle, High knees, Single leg hip rotation, Side to side hops**					
Exercise Category	Exercises	Level 1 Week 1-3		Exercises	Level 2 Week 4-6	
		Reps	Sets		Reps	Sets
Speed Training	Running 20 meter	4	3	Running with ½ wt	4	3
	Plyometric Jacks	5	3	Tuck Jump	5	5
	A Skips 10 meter	3	1	B Skips 10 meter	5	1
	5-10-5 Shuttle run	5	3	Staggered Shuttle-run-shuffle run	5	5
Dynamic Strength Control	Split Squats b/l	5	3	Single Leg squat	5	5
	Lateral Lunges b/l	5	3	Walking Lunges	5	5
	Bicycle Crunches	5	3	Vertical leg crunches	5	5
Motor Control	Plank Walk	5	3	Plank Straddle	5	5
	Plank Jacks	5	3	Mountain Climbers	5	5
Explosive Power of upper limb	Kneeling Rows with Dumbbell	5	3	Side plank row with dumbbell	5	5
	Plyometric Pushup	5	3	Archer Pushp	5	5
	Medicine ball power drops	5	3	Medicine ball rotatory slam	5	5
	Static rotational chest pass	5	3	Plank medicine ball pass	5	5
Reaction time	Hitting on top of the ball	10	3	Multiball drill	10	5
	Rapid ball toss	10	3	Deflection drill	10	5
	Two ball drill	10	3	Sidearm thrower drill	10	5
Cool down (5min)	Adductor stretch, Hamstrings stretch, Hip flexors stretch, Knee to chest Stretch, Overhead triceps stretch, Quadriceps stretch, Standing forward bend.					

Protocol to be followed Thrice a week for 6 weeks. Duration of one session is 40-45 minutes

Table 2 Conventional Group Exercises

Exercise Category	**Exercise**	**Volume**	
Warm Up	Light jog, Glute kicks, side shuffle, High knees, Single leg hip rotation, Side to side hops (1- 6 weeks)		
		Reps	Sets
Batting drills	Throw downs	12	2
	Net sessions	15	2
Fitness and conditioning	Agility ladder drills	2	1
	Sprinting between wickets	15	2
	Lunges and squats	15	2
Cool Down	Adductor stretch, Hamstrings stretch, Hip flexors stretch, Knee to chest Stretch, Overhead triceps stretch, Quadriceps stretch, Standing forward bend. (1-6 weeks)		

Duration 5-7 minutes, frequency of 3 days per week

III. RESULTS

At the baseline, there were non-significant differences between the groups in age, height, weight, BMI as $p>0.05$. The demographic and physical characteristics of participants at the baseline are shown in Table 2.

Table 3 there is no Significant Difference found in Baseline Characteristics between two Groups for age, Gender and bmi.

Characteristics	**Experimental (n=25)**	**Control (n=25)**
Age, mean (SD)	21.95 (1.73)	21.5 (1.82)
Gender Male	13 (65%)	14 (70%)
Female	7 (35%)	6 (30%)
BMI, mean (SD)	22.64 (1.68)	23.65 (1.17)

Inter-group comparison at week 6 of means between Experimental and control groups:

- *Reaction time:*

Unpaired t-test is used to compare means of the post intervention score of Reaction time between Group A and Group B. t value obtained is -2.795 and p value is 0.008 which shows significant differences between both groups.

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Mean of Post intervention values of Sprint performance of both groups are compared using unpaired t test which shows p value of 0.001 and t value of -4.816 it suggests that there is highly significant difference found between both the two groups.

Table 4 Comparison of means of post score of Reaction time and sprint Performance

Variables	Group A	Group B	t- value	p- value
Reaction time	0.18±0.01	0.20±0.02	-2.795	0.008
Sprint performance	4.08±0.41	4.66±0.34	-4.816	<0.001

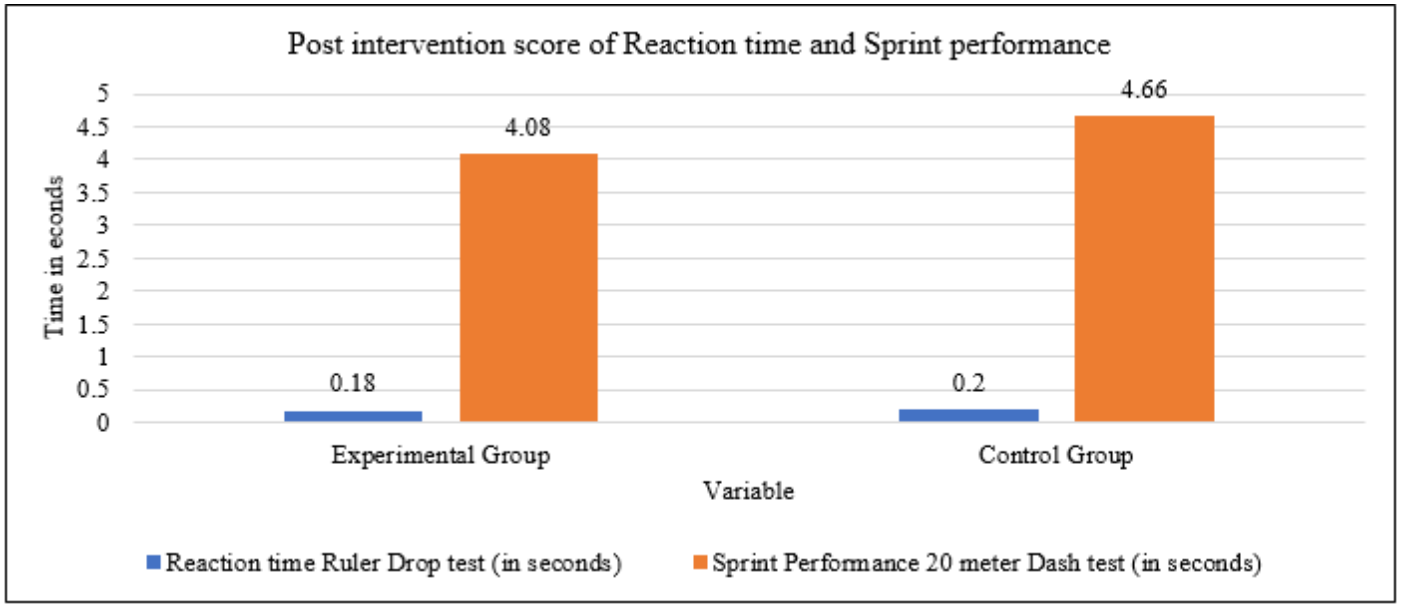

Fig 2 Between the group Comparison of Reaction time and sprint Performance at week 6

➢ *Explosive power of upper limb*

Mean of Post intervention values of Explosive power score of both groups is comparedusing unpaired t test which shows p value of 0.001 and t value of 4.047 indicating significant differences between both groups.

Table 5 Comparison of means of post score of Explosive power of upper limb

Variables	Low intensity	Moderate intensity	t- value	P- value
Explosive power of upper limb	4.12±0.22	3.83±0.23	4.047	<0.001

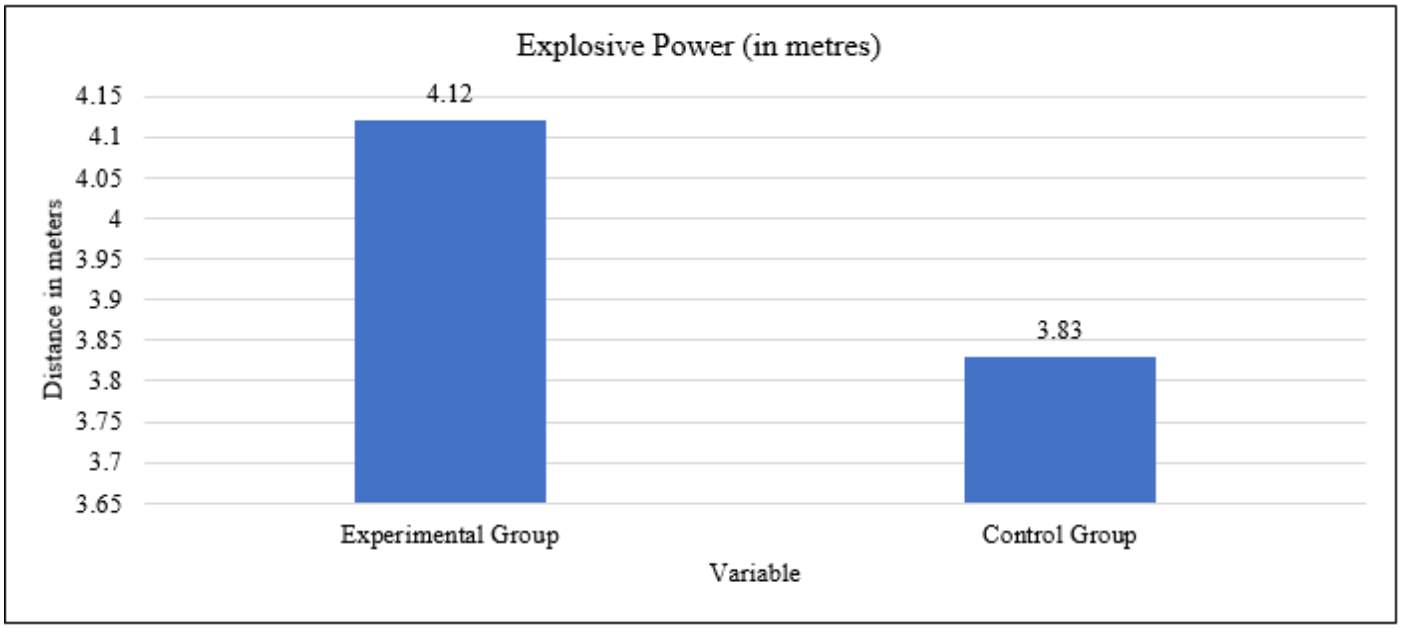

Fig 3 Between the group Comparison of Explosive power of upper limb at week 6

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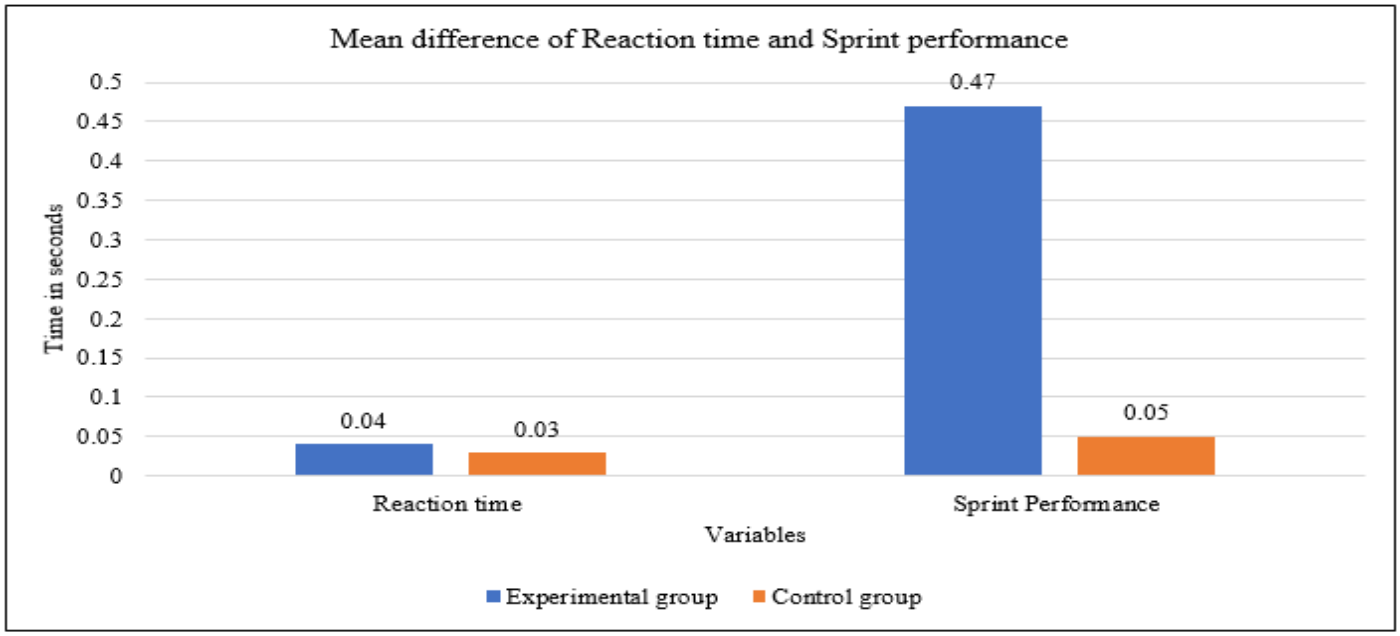

Fig 4 Mean Difference between Experimental and Control group

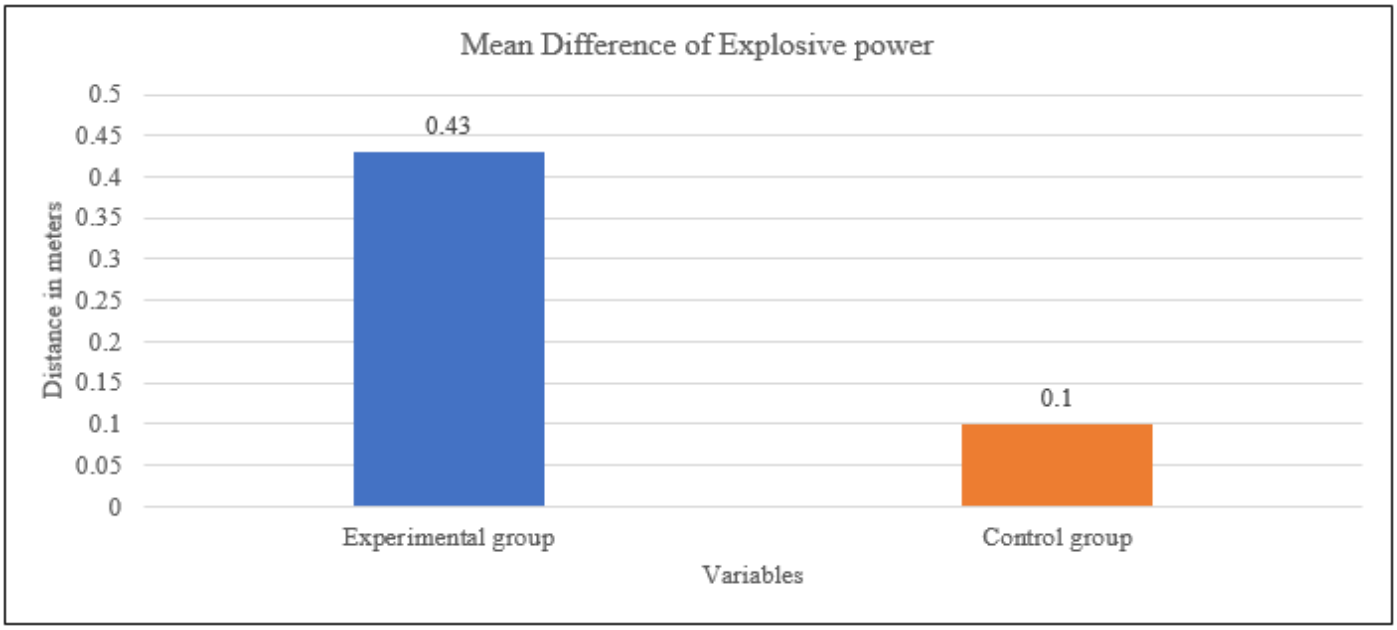

Fig 5 Mean Difference between Experimental and Control group

At week 6 the Reaction time and sprint performance of the experimental group was found to be highly significant and explosive power of upper limb was found to be significant and the effect size calculated was high for Reaction time and Sprint performance and low effect size was found for the explosive power of upper limb

IV. DISCUSSION

The current study was undertaken to determine the effect of Crickfit Intervention program which is designed as an attempt to increase the levels of selective fitness variables in amateur Batsmen. Through customized workout plans based on each athlete's needs, one can close performance gaps and achieve the optimal levels of fitness required for competitive success. The results of this study estimated that a Crickfit Intervention program is more beneficial than conventional training for several outcomes, including Reaction time, power and speed in amateur batsmen. Several underlying mechanisms for these effects of Crickfit intervention program programs have been proposed.

➢ *Reaction time:*

Reaction time plays a crucial role in cricket, particularly for batting and fielding, where split second decisions can determine performance success. The study findings indicate a significant reduction in reaction time (p=0.008) in the Crickfit Intervention group when compared with the control group, suggesting that CRICKFIT training significantly enhances neuromuscular response and cognitive processing speed. Processing visual information regarding the flight trajectories is a crucial cerebral process that batsmen go

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through once the bowler releases the ball. Our findings are also supported by Mann et al 2011, specific visual tracking drills may have improved anticipatory skills, leading to quicker responses, consistent with findings in studies on perceptual-cognitive training in sports The drills used in the Crickfit intervention group have significantly improved the visual reaction time of the batsmen, leading to quicker response following the trajectories of the ball while batting. Crickfit intervention program consists of multiball drills, deflection drills, two ball drills which improved the reaction time in the crickfit intervention group as supported by the findings of Tanishk Choksi et al. administered Ball Drop Drill, Reactive Gear Drill, Shuffle Reaction Ball Drill in cricket players and found significant improvement in the intervention group. According to Gavkare et al, a faster reaction time among athletes over non-athletes indicates improvement in their concentration and alertness, better muscular coordination as well as improved performance at speed. Therefore, a faster visual reaction time would benefit athletes by enabling them to react quickly to the demands of their sports. Findings of Prak MS et al. showed significant improvements in visual reaction time using visual training drills in badminton players the intervention group. By Visual training methods used in crickfit intervention group improved the visual reaction time of amateur batsmen. These results align with previous studies, such as Weldon et al. (2021), who demonstrated that structured visual-motor reaction drills significantly improved the reflex speed of cricketers. Similarly, Mirani et al. (2022) found that specific reaction training drills and ball deviation exercises, enhanced batsmen's ability to respond to bowlers at high speeds. The combination of reaction lights, fielding drills, and ballistic exercises in the CRICKFIT protocol appears to have significantly improved peripheral awareness, decision-making speed, and hand-eye coordination.

- *Explosive Power of upper limb*

Explosive upper limb power is essential for batting, bowling, and throwing in cricket. The medicine ball throw test results indicate a highly significant increase ($p < 0.001$) in post-intervention explosive power in Crickfit intervention group when compared with the control group. This improvement can be attributed to the inclusion of ballistic push-ups, medicine ball slams, and dumbbell-based power training in the CRICKFIT program. Increase in upper limb power may be because of increase in strength due to plyometric exercise training in the crickfit intervention program. Studies have demonstrated that plyometric training results in greater improvements in upper body strength and power output—important components for an effective serve (GarciaCarrillo et al., 2023). Plyometric exercises, like medicine ball throws and explosive push-ups, emphasize rapid stretching and shortening of muscles (Davies et al., 2015), which increases muscle potentiation and recruits fast-twitch fibres (Macaluso et al., 2012). Crickfit intervention training consisted of plyometric and medicine ball which emphasized on rapid stretch-shortening cycle and improved the muscle potential and recruited fast-twitch fibers which showed significant improvement in the crickfit intervention group. Motor control exercises for core stability in the crickfit intervention group improved the stability of core which is the focused part of the body while batting and the force is transferred from the lower extremity. It is suggested that stability in this trunk area is necessary for the best bowling performance because the force is produced by the lower extremities. Additionally, Sankar et al. found a strong correlation between upper limb strength and batting performance, reinforcing the notion that enhancing upper body strength leads to more powerful and well-timed cricket strokes. The increase in medicine ball throw distance post-intervention suggests that CRICKFIT training significantly contributes to enhanced batting efficiency.

- *Sprint Performance:*

Sprinting bouts are regularly performed by the batsmen during running between the wickets in cricket. Our findings showed highly significant improvements ($p<0.001$) in the 20 m sprint time of amateur batsmen in the experimental group in comparison to the control group. Increased neuromuscular activation of the trained muscles, specifically an increase in the number and firing frequencies of activated motor units, as well as modifications to the recruitment pattern of the motor units (mainly in fast-twitch muscle fibres), may be the cause of improved sprint performance following Crickfit intervention program Study is also supported by the findings of Yugang Zhang et al. (2024) Strength and resistance training are commonly used in athlete training, physical education, and research to improve movement speed. Improved lower limb coordination and muscular coactivation have been linked to running economy gains, a result of strength training treatments. This would ultimately result in increased muscle stiffness and a reduction in ground contact times. Strength training interventions have also been proposed to improve the strength of type I and type II fibres, which reduces the activation of motor units to generate a given force. A runner may be able to run more effectively at a given running speed thanks to this strength gain, which may also enhance biomechanical efficiency and muscle activation patterns. Mirani et al. (2023) compared sprint times between batsmen and bowlers and found that structured plyometric and resistance training led to significant sprint performance improvements. The incorporation of, ladder drills, plyometric jumps, and medicine ball exercises in the CRICKFIT program likely contributed to these notable gains in speed and acceleration. The effectiveness of the stretch-shortening cycle may also be improved by neuro mechanical adaptations like increased neural drive to agonist muscles and muscle-tendon stiffness optimization. Improvements in the lower body musculature's stretching shortening cycle are likely to result in increased force production in the concentric movement phase following rapid eccentric muscle action, which is a crucial prerequisite to improve sprint performance. Study by W. Young et al (2007) supports the results of present study, they stated that the strength training of sprinters increases the ability of leg to generate forces in short time i.e., with maximum explosive force, which increases there sprinting performance. Increased limb length, musculotendinous tissue alterations, larger muscles, and improved neural and motor development for improved movement quality and coordination all contribute to complex changes in physical performance.

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V. CONCLUSION

From analysis of current study, we conclude that both Groups showed significant improvement in Reaction time, Explosive power, Sprint performance. When compared between groups Crickfit intervention group showed highly significant difference in Explosive power and Sprint performance and significant difference in reaction time after 6 weeks of training.

CLINICAL IMPLICATION

The study provides evidence for a structured training program specifically designed for amateur batsmen, offering an alternative to traditional cricket training methods. The program's focus on sprint performance, upper limb explosive power, and reaction time can help batsmen improve their running between wickets, shot power, and quick decision making.

NOVELTY OF THE STUDY

The novelty of this study lies in its structured Crickfit Intervention Program, specifically designed to enhance fitness variables in amateur batsmen. In contrast to general fitness regimens, Crickfit incorporates plyometrics, sprint drills, and reaction training to cater to the movements of batsmen. Using approved performance tests (such as the 20-meter sprint test, medicine ball throw, and ruler drop test), the study measures the program's efficacy. The majority of fitness study focuses on professional or elite cricket players. This study, which focuses on amateur batters, addresses a research gap for prospective players.

LIMITATION

The study was limited to amateur level of batsmen and age group 18 to 24 years. Long term follow was not done after the intervention training program of the variables. Physiological barriers in the female athletes were not considered during implementation of the study protocol. Participants nutrition, sleep patterns, differences in physiological responses to training may affect the results.

FUNDING

None

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