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A COMPARATIVE STUDY BETWEEN AGILITY LADDER TRAINING AND CIRCUIT TRAINING ON AGILITY AND FUNCTIONAL PERFORMANCES IN UNDER 19 PROFESSIONAL BATSMEN

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ABSTRACT

Background: Cricket is a team sport in which players have considerable demands on physiological and neuromuscular coordination to adapt to speed and performance. Training for batsmen should include the development of rapid change in direction abilities while running between wickets requires high levels of agility and functional performance.

Methodology: A total number of 45 individuals were selected for the study. They were divided into three groups of 15 each. Group A was given Agility ladder training Group B was given Circuit training and Group C was given conventional exercise. Pre- and post-agility and Functional performance was assessed by the Illinois Agility test and Functional movement Screening Score.

Result: For Group A, the p-value for IAT and FMS was less than 0.0005 Wilcoxon Signed Ranks test was used for within-group comparison. For Group B, , p-values for IAT and FMS were found to be less than 0.05, and thus, the Wilcoxon Signed Ranks test was used for within-group comparison. Between all three group comparisons, ANOVA tests are used.

Conclusion: This study concludes that significantly greater improvement was observed in Group A which received Agility ladder training along with conventional exercise technique for the Illinois Agility test than in Group B which received Circuit training along with conventional exercise.

Keywords: Agility, Agility ladder, Circuit training, and Functional performance, Batsmen

INTRODUCTION

Cricket is a team sport in which players take on various roles such as bowler, fielder, or batsman and it consists of players engaging in intermittent activity striding, sprinting, and other repetitive movements jumping and turning **[1]**. Cricket places significant physiological demands on individuals, necessitating muscular strength and endurance, cardiovascular fitness, speed, agility, power, flexibility, and other attributes **[2]**. the individuals most susceptible to injury are younger athletes, with an average age of 16.8 years, who exhibit a heightened vulnerability to injuries due to their ongoing developmental processes, which may not be fully completed **[3]**. Cricket is engaged in entertainment, health, and professional development whenever young. The inherent risk of injury makes young athletes especially susceptible to cartilage damage, which exhibits reduced resilience to repeated micro-injuries, apophysis injuries, and growth plate injuries **[4]**. many pivotal moments in the game involve quickness and agility, like bowling, diving to catch, sprinting between the wickets to score runs, or swiftly stopping to throw for runout chances. Agility is a critical component of the game, serving as a significant determinant of success alongside other essential factors **[5]**. In modern cricket, agility is required for quick direction changes, dashing between the wickets, ball catching, and ball chasing. Therefore, in terms of performance, agility is crucial in modern cricket. Johnson and Nelson defined it as the physical ability that enables rapid and exact changes in body position and direction, whereas Baley defined it as the capacity to change direction swiftly and effectively while moving as nearly as feasible at full speed **[6]**.There are various treatment approaches used to improve agility and functional performance in the athletic population, some of them are plyometric training, Sprint training, Change of Direction (COD) training, Agility ladder training, Combined training (Resistance and plyometric training) (Speed and plyometric training) **[7]**. Agility ladders have been marketed as a way to increase a wide range of physical abilities, including Kinesthetic awareness, balance, coordination, footwork, and agility. Ladder exercise sessions enable individuals to strengthen brain connections by replicating the instantaneous reflection and reaction necessary when hitting or fielding. by employing foot motions. Athletes need to swiftly move their feet while maintaining balance during fielding and sprinting across the field. To optimize their effectiveness, ladder drills should progress from simpler to more intricate

setups. Furthermore, forcing different appearances up on the employment ladder encourages the movements performed throughout the competition **[8]**. The training progresses from general expansion for the enhancement of advanced skills, moving from complete movement to reduced, faster movements. Using the concept of starting with deliberate and unhurried motions and transitioning to rapid, forceful actions as part of a teaching and learning advancement results in enhanced achievement **[9]**. circuit training was established in 1953 as a successful and streamlined method for coaches to educate an enormous number of athletes in a brief amount of time using little equipment **[10]**. Circuit training is a form of physical conditioning that includes endurance, strength, high-intensity aerobic exercises, and circuit-based routines akin to high-intensity interval training. It focuses on muscle endurance and strength building. A "circuit" in an exercise program refers to completing all prescribed exercises once. Once a round is finished, the first exercise is repeated to begin the next circuit. In circuit training, the duration between exercises is typically brief, with a swift transition to the subsequent exercise **[11]**. during a match, repetitive movements or during running between wickets may cause fatigue in specific muscles. As a result, players must include some muscular endurance exercises in their strength training routines. Running speed is a function of stride frequency, stride length, speed endurance, and form (efficiency of movement). The findings of studies suggest that there is no doubt that circuit training will lead to an increase in agility **[11, 13]**. There is lack of studies that compare agility ladder training and circuit training for agility and functional performance in batsmen. This project will investigate the similarities and differences between agility ladder training and circuit training to improve agility and functional performance in batsmen.

MATERIALS AND METHODS

The study included Both male and female Professional batsmen Aged between 12 – 19 years, Practicing cricket at least 3 times a week. Playing cricket 15-20 hours of training per week. players who were experienced in playing for at least 2 years **[12]**. history of any musculoskeletal Illness around six months of the incident, Background concerning prior surgeries or hip, knee, ankle, or back within 12months, and any recreational players will be excluded. Previous occurrences of psychiatric, neurological, cardiovascular, or respiratory conditions, Participants using any type of pharmacological therapy, medical issues, or anyphysical limitation, and Players Consuming any intense workout or Gym were excluded from the study **[12,**

13]. the Agility was assessed by the "Illinois Agility Test". And it was administered both before and after the intervention to assess agility outcomes. The reliability of the Illinois agility test is 0.96 **[14]**. The Functional performance was assessed by the FMS Scoring sheet. The Functional Movement Screen (FMS) is employed for analyzing seven fundamental patterns of motion in people who do not have pain or musculoskeletal disorders. This study aims to document the score distribution and examine it. if FMS scores could predict injuries ina significant military population, assessing its reliability. Several studies have shown the FMS screen to have excellent reliability **[12]**. The inter-rater reliability of the test was shown to be high, and the interclass coefficient (ICC)was 0.906 **[14]**.

The research commenced following the acquisition of ethical approval from the institution. After participants signed consent forms and met inclusion-exclusion criteria, they were divided into three groups. Outcome measures Evaluations were performed before and afterwards the course of action. Each group followed a protocol of Three days every week for six weeks **[15, 16]**. Each of the three groups undergoes a 3-minute energetic warm-up phase stretching that is a static routine, this was followed by the intervention and concluded with a 2-minute cool-downincorporating both static and dynamic stretching exercises **[17]**. Group A underwent Agility ladder training along with conventional exercise Group B circuit training along with conventional exercise and Group C underwent Conventional exercise.

Table 1: Dosage of Group A intervention [15, 16, 18, 19]

Week	Exercises	Sets	Rest
1-2	Rabbit Hop Lateral in and out Two-footed side hopes down One lateral	3	2 min
3-4	Forward hopscotch Backward hopscotch Straddle hops Skiers jump	3	2 min
4-5	Hopscotch variation One-foot laterally inside-out hops Forward single-leg hop Single-foot hops weaving pattern	3	2 min

Table 2: Dosage of Group B intervention [10, 11, 13]

Week	Name of station	Duration of circuit	Circuit	Rest in between the circuit
1-2	1. Jump rope 2. Sit-ups 3. Hurdle hop 4. Step up-down 5. Jumping Jack 6. Jack-knife 7. Back extension 8. Lateral jump over line	15 sec	3	2 min
3-4		20 sec	3	2 min
5-6		25 sec	3	2 min

Table 3: Dosage of Group C intervention [13, 20, 21]

Week	Exercise	Set	Rest
1-2	Running	3	2 min
3-4	Shuttle sprint	3	2 min
5-6	Push-up Back extension exercise	3	2 min

RESULTS

The data gathered analysis utilizing SPSS Version 26.0. For Group A, which received Agility ladder training along with conventional exercise, the p-value for IAT and FMS was less than 0.0005 Wilcoxon Signed Ranks test was used for within-group comparison. For Group B, which received Circuit training along with conventional exercise, p-values for IAT and FMS were found to be less than 0.05, and thus, the Wilcoxon Signed Ranks test was used for within-group comparison. Between all three group comparisons, ANOVA tests are used.

Table 4: Gender Distribution of Groups A, B, AND C

	GROUP A		GROUP B		GROUP C	
Objectives	N	%	N	%	N	%
Female	2	13.3	1	6.7	2	13.3
Male	13	86.7	14	93.3	13	86.7
Total	15	100	15	100	15	100

Table 5: Mean Distribution of Age, Height, and Weight in Groups A, B, AND C

	GROUP A	GROUP B	GROUP C
	Mean ± SD	Mean ± SD	Mean ± SD
AGE	14.07± 2.89	14.60 ±2.10	14.40±2.26
HEIGHT (cm)	14.27±14.17	15.47±11.2	15.33±11.64
WEIGHT (kg)	38.64±12.36	50.13±8.75	49.33±10.38

Table 6: Between Group Analysis

OUTCOMES MEASURES	GROUP A	GROUP B	GROUP C	P-VALUE (BETWEEN GROUPS)
	MEAN± SD	MEAN ±SD	MEAN ±SD	
PRE IAT (SEC)	18.47±1.23	17.34±1.82	17.193±1.69	0.060
POST IAT (SEC)	15.56±0.98	15.88±1.59	16.220±1.74	0.660
PRE FMS	12.40±1.18	12.80±1.52	12.93±1.62	0.567
POST FMS	15.93±1.75	15.33±1.72	15.20±1.66	0.485

DISCUSSION:

The participants' agility and functional performance were evaluated using the Illinois agility test and functional movement screening before and after the intervention. Before the intervention, the average pre-intervention score for the Illinois agility test was 18.47 seconds, and for functional performance, it was 12.40. After the intervention, the average post-intervention score for the Illinois agility test was 15.56 seconds, and for functional performance, it was 15.93. This finding aligns with Past investigations that demonstrate the beneficial effects of agility ladder training on athletic performance. Previous research

was conducted by Jodi Gandala Putra *et al* who investigated the effect of an agility ladder workout on the swiftness of the beginning (U 12-13) badminton athletes. According to Almuslimiati, agility refers to the capacity to move in various directions; individuals with high agility can navigate in multiple directions. Another perspective, as Nugraha *et al*., outline agility as the capability to swiftly and accurately alter direction in response to time changes without losing balance **[22]**. the present study's findings support and confirm these earlier conclusions.Group B underwent a regimen comprising a blend of Circuit training and conventional exercises. The agility and functional capabilities of the participants were assessed using the Illinois agility test and functional movement screening both before and after the intervention. Before the intervention, the mean score for the Illinois agility test was 17.34 seconds, while for functional performance, it stood at 12.93. Following the intervention, the mean score for the Illinois agility test decreased to 15.88 seconds, and for functional performance, it increased to 15.33. Moraru *et al*. noted that circuit training significantly contributes to enhancing strength, endurance, flexibility, and overall fitness levels among athletes. Agility, which means being capable of instantly evolving direction and body position, is contingent on essential factors such as strength, speed, and elasticity. Regular engagement in circuit training is recognized for its excellent impact on physical strength, speed, cardiovascular health, and overall flexibility, all of which are critical for enhancing agility. The circuit's training sessions primarily targeted muscles in the legs, arms, and trunk, giving rise to greater strength and, possibly, improved speed and agility. This underscores the principle in sports training that enhancing various motor abilities can synergistically improve overall performance **[23]**. The present study's overarching finding suggests that functional performance saw comparable improvements across all groups studied. This implies that there were no significant disparities in the enhancement of functional abilities among the various experimental or control groups investigated. The observed outcome can be attributed to the contrasting attributes of exercises in agility ladder training versus circuit training. While circuit training emphasizes enhancing strength and muscular endurance to bolster agility, agility ladder training focuses on facilitating explosive muscle contractions to generate greater force and power. These distinctive characteristics of agility ladder training may have a more pronounced impact on agility development compared to circuit training.

Notably, the agility ladder regimen involves frequent jumps and hops, which simulate rapid reflex actions, thereby reinforcing neural connections in the brain associated with instantaneous reflection and reaction, enhancing agility. The research methodologies employed by Jodi Gandala, Putra *et al*, Almuslimiati, Nugraha *et al*, and P. Mahesh provide substantial backing for the efficacy of these interventions. Consequently, these findings serve as compelling evidence of the significant effectiveness in enhancing both agility and functional performance.

CONCLUSION

This study concludes that significantly greater improvement was observed in Group A which received Agility ladder training along with conventional exercise technique for the Illinois Agility test than in Group B which received Circuit training along with conventional exercise. Both methods were found to be equally effective for Functional performance. As a result, both methods are successful in increasing Agility and Functional performance.

Ethics: On 22nd February 2023, The research was approved by the Institutional Ethics Committee for Human Research Sainath Hospital, Ahmedabad (IECHR-Sainath Hospital). With Approval Number: IECHR-SAINATH HOSPITAL/AHMC/88.

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