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# The effectiveness of 4 weeks of agility training on speed in off season runners: AN experimental study

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**Abstract**
**Background:** Running, foot racing over a variety of distances and courses and numbering among the most popular sports in nearly all times and places. Modern competitive running ranges from sprints (dashes), with their emphasis on continuous high speed, requiring great endurance. (1) OFF SEASON **Runners:** An off season runner is defined as a player who is physically active but who does not train for competition at the same level of intensity and focus like a competitive athlete. OFF SEASON: Phase where time off is taken from the structured plan and racing. It can vary from 4 weeks to 8 weeks or more (2) Agility training has a positive effect on movement technique and the ability to produce force in leg muscle more efficiently.
**Objectives:** To study the effectiveness of 4 weeks of Agility training on speed in off season runners between the age group of 18-26 years using 20m dash test.
**Methods:** Various grounds and tracks were visited in and around the city. The subjects were selected on the basis of their inclusion and exclusion criteria. The subjects were explained about the study before starting the procedure. Consent was taken from the subjects who wish to participate in the study. 20 m dash test will be done on the subjects and the data was recorded. The subjects had undergone Agility training for 5 days/week for 4 weeks. At the end of 4 weeks the subjects were reassessed using 20m dash test and the data was recorded again. Data analysis was done.
**Results:** The difference between PRE and POST were compared and analyzed using paired 't' -test for all the components. P value is 0.0001, it is to be considered statistically significant this study agility training shows significant effect on speed in off season runners.
**Conclusion:** In this study agility training shows significant effect on speed in off season runners. The findings of this research indicate that agility training can also be used as training method for improving athletes speed and overall performance.

**Keywords:** agility, off season, speed, athlete, sprint, training, runner, movement, technique

## Introduction

**Running:** Running, foot racing over a variety of distances and courses and numbering among the most popular sports in nearly all times and places. Modern competitive running ranges from sprints (dashes), with their emphasis on continuous high speed, requiring great endurance [1].

Sprinting is running over a short distance in a limited period of time. It is used in many sports that incorporate running, typically as a way of quickly reaching a target or goal, or avoiding or catching an opponent [2]. At the professional level, sprinters begin the race by assuming a crouching position in the starting blocks before driving forward and gradually moving into an upright position as the race progresses and momentum is gained. The set position differs depending on the start. The use of starting blocks allows the sprinter to perform an enhanced isometric preload; this generates muscular pre-tension which is channelled into the subsequent forward drive, making it more powerful. Body alignment is of key importance in producing the optimal amount of force. Ideally the athlete should begin in a 4-point stance and drive forwards, pushing off using both legs for maximum force production [3].

Athletes remain in the same lane on the running track throughout all sprinting events, with the sole exception of the 400 m indoors. Races up to 100 m are largely focused upon acceleration to an athlete's maximum speed [3].

**Off Season Runners:** An off season runner is defined as a player who is physically active but who does not train for competition at the same level of intensity and focus like a competitive athlete.

**Off Season:** Phase where time off is taken from the structured plan and racing. It can vary from 4 weeks to 8 weeks or more [2].


Importance of Speed in Runners

**Importance of Speed in Runners**

Speed can be defined as the ability of muscles to contract quickly; also known as fast continues movements of body parts. An individuals speed is often determined by the muscle fibre they are born with, this being fast-twitch or slow-twitch fibres. These fibres have a strong influence on athletic speed and how fast an athlete can accelerate overall. Speed also requires maximal speed of movement, and also speed maintenance. Movement speed requires good strength and power, but also too much body weight and air resistance can act to slow the individual down. In addition a high proportion of fast twitch muscle fibres, it is vital to have efficient mechanical technique over movements to optimize the muscular power your body is putting out. Speed is the most important aspect for the success in sprinters, as it focuses on technique, power and strength overall, whilst maintaing a healthy overall fitness profile for the athlete themselves. (r)

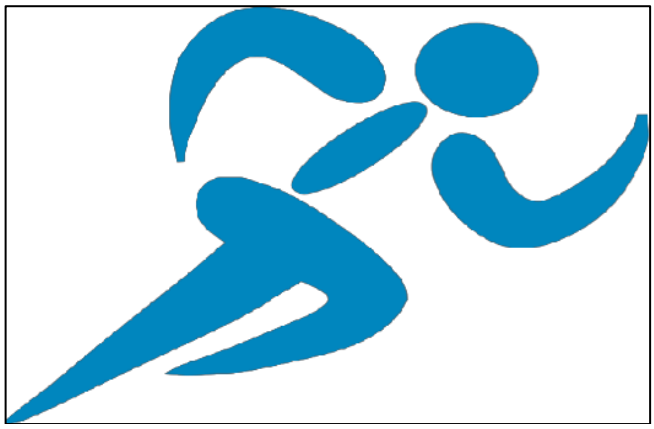
The sprint start involves near maximal activation and complex, functional movements of an athlete's gross musculature. A powerful start is crucial to attaining an optimal standard of performance in a sprint race4. Three key contributors to the sprint start are reaction time, movement time, and response time. Minimizing the duration of each of these components can contribute to a faster start time, and ultimately a better sprint performance. Reaction time is the time it takes to initiate the response to a given stimulus. In the sprint start, the stimulus is the sound of the start gun and reaction time is measured by the first change in force after the gun. Movement time is the onset of the response until the end of the movement. In the sprint start, movement time is monitored from the end of reaction time, when the force by the rear foot on starting block is 0 Newtons, to when the same foot has completed its first successful strike on the ground. Total response time in the sprint start is the time interval that begins at the onset of the "go" signal and halts at the completion of the movement, the first foot strike. Response time is therefore a resultant of the reaction time and movement time combined [5].

**Short comings in off season**

- Decreased overall performance [6]

**Agility Training**

Agility is he ability to change the direction of the body efficiently and effectively and to achieve this requires a combination of: Balance, Speed, Strength, Coordination [4].



Agility Training

Therefore, agility training is a type of exercise training that incorporates short bursts of movement that involve changes of direction. Agility training usually incorporates exercises such as cone drills and/or ladder drills in which the exerciser has to complete different movement patterns or foot patterns fast as possible [7].

Agility Training

Agility training has a positive effect on movement technique and the ability to produce force in leg muscle more efficiently. Single leg movement improves intra- and inter-muscular coordination, which results in a better athletic power performance in sprinting and jumping tasks. Agility training can also be used effectively as a training method for improving explosive leg power and dynamic athletic performance.

It has been seen that agility exercises have a positive effect on changing direction and speed characteristics and thus on sportive performance in Handball Players [8].

**Need of Study**

The demand of performance in runner between the age group 18-26 years is high. Hence it is necessary to recover the decrease in performance in off season runners. Off

season runners usually lack in speed and overall performance [6].
Limited studies have been done on effect of agility training on speed in runners. Very few studies have been conducted on effect of agility training on speed in off season runners. Lack of training protocol to increase the running speed in off season runners.

**Subjects**
**Included:** Off Season runners between the age of 18-26 years [7], both males and females, Sprinters (100mtr - 400mtr), Average timing of 20m dash test ranges from 3sec to 4sec for males and 4-5 secs for females.

**Excluded:** Unwilling to continue subjects, Recent lower limb fractures, Soft tissue injuries, Hypotensive, Cardiorespiratory pathologies, Auditory impairments, Cognitive Impairments.

**Outcome Measures**
**The 20 Meter Dash Test**
The 20 Meter Dash is part of the SPARQ rating system [10]
Purpose: The aim of this test is to determine acceleration, and also a reliable indicator of speed, agility and quickness.
Pre-test: Explain the test procedures to the subject. Perform screening of health risks and obtain informed consent. Prepare forms and record basic information such as age, height, body weight, gender, test conditions. Measure and mark out the test area. Perform an appropriate warm up.
Procedure: The test involves running a single maximum sprint over 20 meters, with the time recorded. A thorough warm up should be given, including some practice starts and accelerations. 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. The tester should provide hints to maximizing speed (such as keeping low, driving hard with the arms and legs) and encouraged to continue running hard past the finish line.
Results: Two trials are allowed, and the best time is recorded to the nearest 2 decimal places. The timing starts from the first movement (if using a stopwatch) or when the timing system is triggered, and finishes when the chest crosses the finish line and/or the finishing timing gate is triggered.

ICC=0.935 Reliability

**Method**
An approval was granted from the ethical committee in PES MCOP. Ethical approval was granted by the institute. Various grounds and tracks were visited in and around the city. The subjects were selected on the basis of their inclusion and exclusion criteria. The subjects were explained about the study before starting the procedure. Consent was taken from the subjects who wish to participate in the study. 20 m dash test will be done on the subjects and the data was recorded. The subjects had undergone Agility training for 5 days/week for 4 weeks. At the end of 4 weeks the subjects were reassessed using 20m dash test and the data was recorded again. Data analysis was done.

**Protocol**
Warm UP:
For 8-10 mins before the training session. Ankle rotations, Knee rotations, Hip rotations, Walking lunges, Side shuffle, Skips

**Week 1-2**
Cone drills, Ladder drills (fast feet, scissor, high knees)

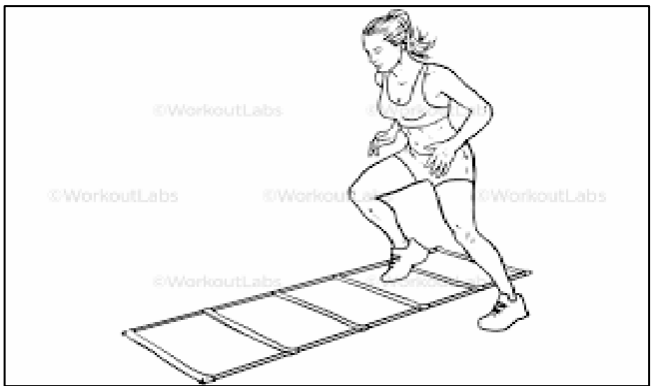



**Fig 1:** Ladder Drills

**Fig 2:** High Knees

**Week 3-4**
The ladder drills included fast feet, scissors (inside and outside of the boxes), stack-n- out, and fast feet to the side although catching a reaction ball;with the mini hurdles.
The fourth week will continue work on cones, shuttle runs with mini hurdles; more advanced ladder drills; and an obstacle course combining all drills they had practiced.

**Fig 3:** Ladder drills

The ladder drills consisted of fast feet backwards, scissors out of the boxes, and an in/in/out/out drill [12].

Ladder drills consisted of lateral high knees, lateral scissors with double feet backwards jump in between, Subjects will complete a more advanced obstacle course consisting of cone drill cuts, 2 ladder drills, hurdles, shuttle runs, and box drills. Reps and Sets: Training will be given by dividing minutes wise, consisting of various cones and ladder drills.

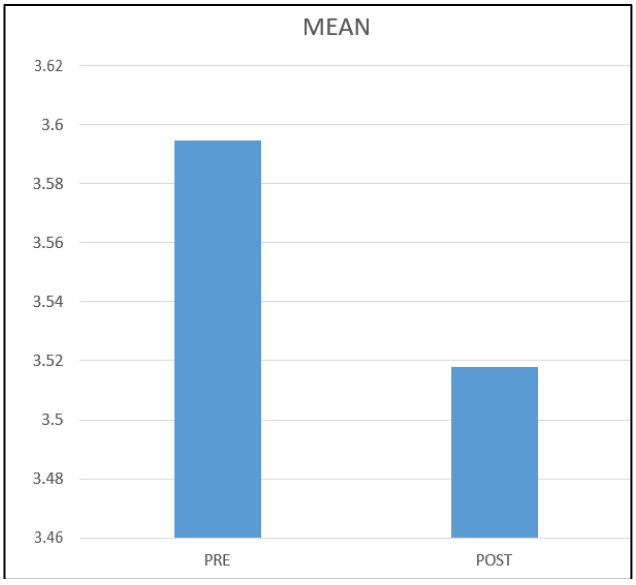
**Fig 4:** Reps and Sets

## Data Analysis

- The data was entered in Excel spread sheet, tabulated and sujected to Statistical Analysis.

In the entire study, the p value < 0.05 are considered to be statistically significant.

| | PRE | Post |
|---|---|---|
| Mean | 3.5947 | 3.5179 |
| SD | 0.3176 | 0.3388 |




**Graph 1:** Mean of timings in 20m dash test

## Statistical Analysis

- In this study, the subjects which have undergone agility training we have found that the Pretest mean speed was 3.5947 and Posttest mean was 3.5179 which shows that treatment of agility training improved their speed significantly (0.0768 = mean of Pre minus Post timings 95% confidence interval of this difference : from 0.0495 to 0.1042)
- Graph 1 shows the representation of pre and post mean.
- The P value is less than 0.0001 By conventional criteria, this difference is considered to be extremely statistically significant

## Result

- The difference between PRE and POST were compared and analyzed using paired‘t’-test for all the components.
- P value is 0.0001, it is to be considered statistically significant.

## Discussion

- Study has been taken into consideration with the ethical committee in PES MCOP
- The present study was done to check the effectiveness of agility training on speed in off seoson runners. In this study total 40 subjects both male and female were included within the age span 0f 18-26 years.
- We found that agility training has good effect on speed in off season runners.
- In our study agility training increases the ability to change the direction of body efficiently and effectivelly in off season runners. Agility exercises incorporates short bursts of movement that involve changes of direction.
- Goran Sporis conducted a study in which he described about how agility training works effectively. Therefore, it is possible that agility training used in this study could have improved the subjects speed performance primarily by improving muscle coordination. Single leg movement improves intra and inter muscular coordination, which results in better athletic performance in sprinting and jumping tasks.
- Agility is combination of: Speed, strength, balance and coordination all of which are trainable as with explosive speed development

## Conclusion

- In this study agility training shows significant effect on speed in off season runners.
- The findings of this research indicate that agility training can also be used as training method for improving athletes speed and overall performance

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