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Effectiveness of plyometric training on agility in male collegiate foot-ball players, an experimental study

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Abstract
Background: The study aimed to evaluate effectiveness of plyometric training program on agility in collegiate football players.
Objective: To measure the effect of 4 weeks of plyometric training on speed of running in collegiate football players.
Methodology: This experiment study was carried out using Agility t-test in football players. A total of 20 samples aged between 19-22 years were included in the study. The plyometric training program was given to the football players. The protocol was of four weeks which consisted six sessions per week.
Results: When plyometric training was given to the collegiate football players the result showed Mean of time duration before plyometric training was 10.94 with standard deviation of 1.360 and post plyometric training mean was 10.25 with standard deviation of 1.007. The mean difference which was calculated as 0.6933. Paired t-test was used to analyse the data with p value 0.003, which is considered as extremely significant. Hence plyometric training improve agility in football players.
Conclusion: From the above study we can conclude that plyometric training is helpful in improving agility in football players. So, these training methods are recommended to collegiate football players for improving speed and skilled performances.

Keywords: Plyometric training, football players, agility

1. Introduction
Plyometric training is popular among individuals involve in dynamic sports and plyometric exercises such as jumping, hopping, skipping and bounding are executed with a goal to increase dynamic muscular performance. Plyometric are techniques used by the athletes in all types of sports to increase strength and explosiveness plyometrics consists of rapid stretching of muscle followed by a concentric or shortening action of the same muscle and connective tissue. The stored elastic energy within the muscle is used to produce more force than can be provided by a concentric action alone. Plyometric training when used with a periodized strength training program can contribute to improvement in vertical jump performance, acceleration, leg strength, muscular power, increased joint awareness and overall proprioception [1].
Plyometrics drills usually involved stopping, starting and changing directions in an explosive manner these movements are components that can assist in developing agility. By enhancing balance and control of body positions during movement agility theoretically should improve. Plyometric training program for pubescent athletes should be introduced into warm ups then added to sport specific skills. When designing the program an effective program accomplishes specific goals through manipulation of four variables; intensity, volume, frequency, and recovery [2].
The ability to maintain and control correct body position while quickly changing direction through a series of movement is called agility. Agility is very important when it comes to a sports player, they use in the opposition but it also helps in preventing injuries optimal activation and inhibition of muscle fibres can prevent muscle tears and even more prevent the joins from injuries [3].

Agility is a complex quality and in recognizing this it has been stated that agility permits an athlete to react to a stimulus start quickly and efficiently move in the correct direction or stop quickly to make a play in a fast smooth efficient and repeatable manner.

Agility has classically been defined as simply the agility to change direction rapidly and accurately some authors have defined agility to include whole body change of direction as well as rapid movement and direction change of limbs. Agility may be classified as simple temporal spatial and universal skills [4].

2. Materials and methodology

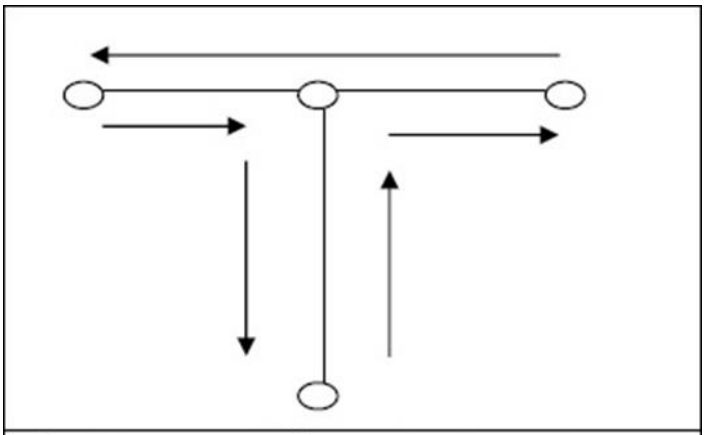
- Study design: An experimental study.
- Sample population: Football players.
- Sample size: 30.
- Sample collection: Continent method.
- Independent variable: Plyometric exercises.
- Dependent variable: Agility t test.
- Inclusion criteria: Males (19-22 age).
- Willing to participate in study.
- Regular Football Players.
- Exclusion Criteria: Recent Injury, Trauma.
- Non-Regular Players.
- Not willing to participate.
- Ligament Reconstruction.
- Materials Required: Stop Watch.
- Measuring Tape.
- Cones.
- Pen.
- Consent form.

This was an experimental study with convenient sampling method consists of 20 young collegiate football players. This Study carried out in Faculty of Physiotherapy, Alva's collage of physiotherapy Campus, moundbird, Mangalore. Duration of this study was 4 weeks. The study Included male collegiate football players with Age group between 19-22 years. Any musculoskeletal injuries, cardiopulmonary or neurological disorders which may not permit the player to perform the running tests were excluded from this study [8].

3. Procedures

- The study is designed as a pre and post interventions, where the measurement of the agility before training and after training has been done.
- T-agility test.

4 cones in the form of T placed (5 yards = 4.57m, 10 yards = 9.14m) the subject stand at cone A, on getting command of the timer the subject run to cone B, and touched the base of cone with their right hand. They then turned left and shuffle sideways to cone C and also touched its base this time with their left hand. Then shuffling sideways to the right to cone D and touching the base with the right hand they then shuffled back to cone B touched with the left hand and run backwards to cone A. the stop watch was stopped as they pass cone A [5, 6].



Three cones are set five meters apart on a straight line. A fourth cone is placed 10 meters from the middle cone so that the cones form a T.

- Athlete starts at the base of the "T"
- Examiner gives signal to go and when athlete crosses the photocell the time begins.
- Athlete runs to middle cone and touches it.
- Athlete side steps 5 meters to the right cone and touches it.
- Athlete side steps 10 meters to the far cone and touches that one.
- Athlete side steps 5 meters back to the middle cone and touches it.
- Athlete runs 10 meters backwards and touches the cone at the base of the T.
- Time stops when athlete crosses the photocell.

Plyometric training program

3.1) Single arm alternate bound: Intensity level medium

Direction of jump: horizontal and vertical

Starting position: Get into comfortable, upright stance with feet shoulder width apart.

Arm action: Single arm.

Preparatory movement: Jog at comfortable pace, begin drill with the left foot forward.

Upward movement: push off with the left foot as it constants the ground. During push off bring right leg forward the thigh to a position approximately parallel with the ground and the knee at 90 degrees. During this flight phase of the drill reach forward with the left arm.

Downward movement: land on the right leg and immediately repeat the sequence on the opposite side upon landing.

Note. A bound is an exaggeration of the running gait; the goal is to cover as great a distance as possible during each stride.

3.2) Double arm alternate leg bound

Intensity level: Medium.

Direction of jump: Horizontal and vertical.

Starting position: Get into comfortable, upright stance with feet shoulder width apart.

Arm action: Double arm.

Preparatory movement: Jog at comfortable pace, begin drill with the left foot forward.

Upward movement: push off with the left foot as it constants the ground. During push off bring right leg forward the thigh to a position approximately parallel with the ground and the knee at 90 degrees. During this flight phase of the drill reach forward with both arms.

Downward movement: land on the right leg and immediately repeat the sequence on the opposite side upon landing.

Note. A bound is an exaggeration of the running gait; the goal is to cover as great a distance as possible during each stride.

3.3 Backward Skip

Intensity level: Low

Direction of Jump: Backward, horizontal and vertical.

Starting Position: One leg is lifting to approximately 90 degrees of the hip and knee flexion.

Arm Action: double arm.

Preparatory movement: Begin with a countermovement on the leg.

Upward Movement: Jump backward with one leg and flex the hip and knee of the nonskipping leg to approximately 90 degrees, both arms should be used to assist with the movement.

Downward Movement: land in the starting position on the same leg. Immediately repeat the skip with the opposite leg.

3.3) Side Skip

Intensity level: Medium

Direction of Jump: Vertical and lateral

Starting position: One leg is lifted to approximately 90 degrees of hip and knee flexion.

Arm action: Reciprocal (as one leg is lifted, the opposite site is lifted)

Preparatory Movement: begin with a countermovement on one leg.

Upward Movement: jump up and laterally on one leg. The opposite leg should remain in the starting flexed position until landing.

Downward movement: land in the starting position on the same leg. Immediately repeat the skip with the opposite leg.

3.4) Skip

Intensity level: Low

Direction of jump: Horizontal and vertical

Starting position: One leg is lifted to approximately 90 degrees of hip and knee flexion.

Arm Action: reciprocal (as one leg is lifted, the opposite site arm is lifted).

Preparatory Movement: Begin with a countermovement on one leg.

Upward movement: Jump up and forward on one leg. The opposite leg should remain in the starting flexed position until landing.

Downward Movement: land in the starting position on the same leg, immediately repeat the skip with the opposite leg.

3.5) Power Skip

Intensity level: Low.

Direction of Jump: vertical and horizontal.

Starting Position: one leg is lifted to approximately 90 degrees of hip and knee flexion.

Arm action: Double arm.

Preparatory Movement: begin with a counter movement on one leg.

Upward Movement: Jump up and forward on one leg, move the flexed, non-jumping leg up and into greater hip and knee flexion while jumping. Both arms should be used to assist with the upward movement.

Downward Movement: land in the starting position on the same leg. Immediately repeat the skip with the opposite leg.

Note: Emphasis is on the effectiveness of the skip.

Training Sessions

Plyometric training program given 6 days a week for 4 conservative weeks, each session began with general warm up of 5 minutes and consisted 5 exercises. The total duration of training session was 50 minutes

4. Data Analysis

Table 1: Age wise Distribution of samples;

Age	19 to 20	20 to 22
No. of participants	14(33%)	6(33%)

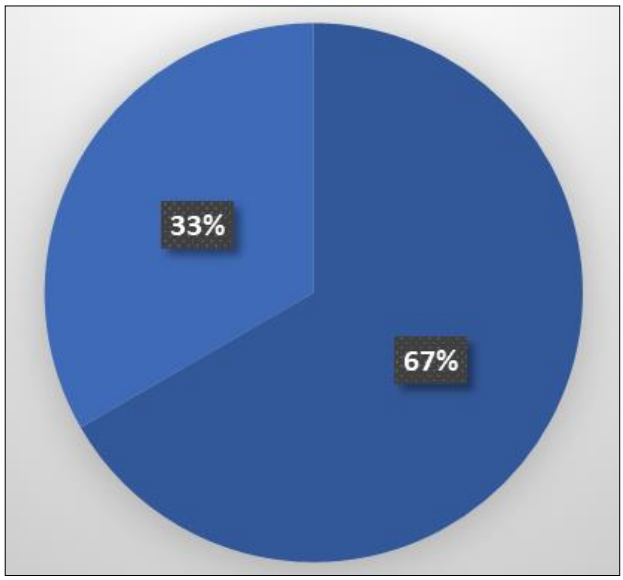


Fig 1: Age wise distribution of samples.

Table 2: Effect of plyometric training on agility

Agility t test	Mean	SD	P Value
Pre	10.94	1.360	0.0003
Post	10.25	1.007	

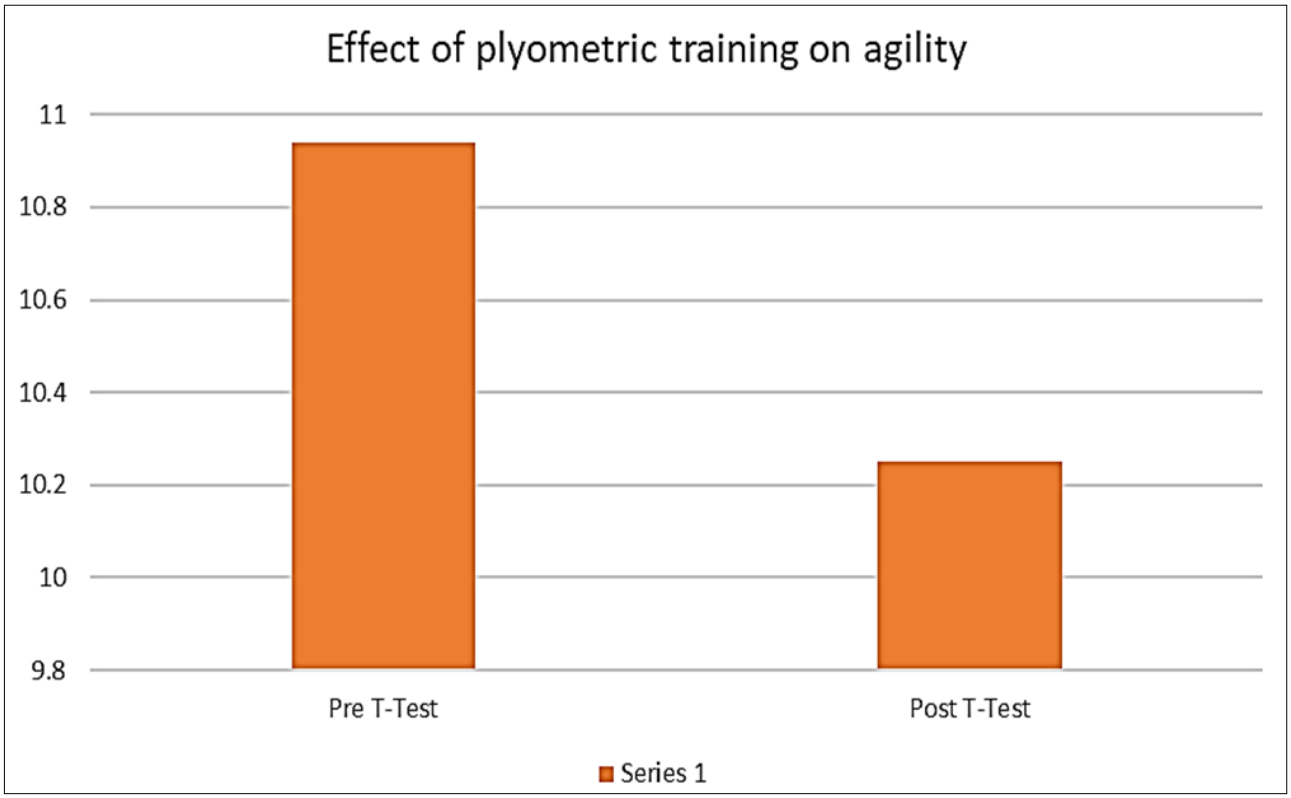


Fig 2: Effect of plyometric training on agility

5. Discussion

The aim of this study was to determine the effectiveness of plyometric training of agility in football players. The age of the participants included in this study was 19-22 years. All males football players were included in this study. In this study total 20 football players were selected in which all male football players were included aged 19-20, 6(26.66%) and aged 20-22, 14(73.33%), which showed improvement in agility. The improvement in agility was tested in terms of time duration the players took to complete the agility t-test,

5.1 The agility was measure pre and post

After analysis of the data there was significant difference in pre and post training time duration. The plyometric training program was for 4 weeks.

According to Rodrigo Ramirez Campillo, *et al.* (2015) [13], plyometric training on maximal intensity exercise and endurance performance were compared between each sample. Intervention induced higher maximal intensity exercise and endurance performance improvements compare to training and the improvement induced by plyometric training were not affected by age in practical terms should not be seen a special concern while applying plyometric training in adult football players at least when the target is improving specific physical performance therefore there is huge significance among each football players with similar competitive for plyometric training [13]. In this study only collegiate football players were included.

Mean of time duration before plyometric training was 10.94 with standard deviation of 1.360 and post plyometric training mean was 10.25 with standard deviation of 1.007. The mean difference which was calculated as 0.6933.

Paired t-test was used to analyse the data with p value 0.003, which is considered as extremely significant. Measuring agility could be more specific in the evaluation of the physical status of the football players as acceleration and deceleration, sudden stops and direction changes occur frequently during games.

6. Result

After analysis of the data there was significant difference in pre and post training time duration. The plyometric training program shows improvement in agility in football players.

Fig 3: Single arm alternate bound

Fig 4: Double arm alternate bound

Fig 5: Backward Skip

Fig 6: Side Skip

Fig 7: Skip

Fig 8: Power Skip

Fig 9: Outcome Measure: The agility of the subject was assessed by a 9*4 T-Test. [7]

7. Conclusion

- From the above study we can conclude that plyometric training is helpful in improving agility in collegiate football players.
- So, these training methods are recommended to collegiate football players for improving speed and skilled performances.

8. Financial disclosure

There is no financial disclosure present for the present study.

9. Acknowledgement

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10. Conflict of Interest

We wish to confirm that there are no known conflicts of interest associated with this publication and there has been no significant financial support for this work that could have influenced its outcome.

We confirm that the manuscript has been read and approved by all named authors and that there are no other persons who satisfied the criteria for authorship but are not listed. We further confirm that the order of authors listed in the manuscript has been approved by all of us.

We confirm that we have given due consideration to the protection of intellectual property associated with this work and that there are no impediments to publication, including the timing of publication, with respect to intellectual property. In so doing we confirm that we have followed the regulations of our institutions concerning intellectual property.

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11. References

1. Michale Miller G, *et al.* The effect of a 6-week plyometric training program on agility. J Sports Sci. Med; c2006. p. 459-465.
2. Roopchand, *et al.* plyometric training improves power and agility in netball team, west Indian, med J. 2010;59(2):183-7.
3. Vaczi M, *et al.* short-term high intensity plyometric training program improves strength, power and agility in male soccer players, Journal of human; c2013.
4. Chelly *et al.* Effects of season short term plyometric training program on leg power, jump and sprint performance of soccer players. Journal of strength and conditioning research; c2010. p. 2670-2676.
5. Timothy E, *et al.* plyometric training in female athletes SAGE Journals; c1996.
6. Kent Adams, *et al.* The effect of six weeks of squats, plyometric training on power production, Sports science Research; c1992. p. 36-41.
7. Daniel J, *et al.* A comparison of plyometric training technique for improving vertical jump ability and energy production, Journal of strength. 1998;12(2):85-89.
8. Neely FB *et al.* Biomechanical risk factors for exercises related lower limb injuries, Sports Med. 1998;26:395-41.
9. Jay Hoffman R *et al.* Effects of short term plyometric and resistance training program on fitness performance in boys age. J Sports sci Med; c2007. p. 519-525.
10. Thomas K, *et al.* The effects of two plyometric training technique on muscular power and agility in youth soccer players. Journal of strength and conditioning research. 2009 Jan 1;23(1):332-335.
11. Wilkerson GB, *et al.* neuromuscular changes in female collegiate athletes resulting from a plyometric jump training program. J Athl train. 2004;39(1):17-23.
12. Aashish Kumar, *et al.* the effect of six weeks plyometric training on agility in male basketball players; c2015. p. 183- 190
13. Rodrigo Ramize-campillo, *et al.* effect of plyometric training on maximal intensity; c2005.
14. Donald, *et al.* Progressive plyometrics for kids; c2006
15. Baljinder Singh Bal, *et al.* conducted a study on Effects of a short-term plyometric training program of agility in young basketball players; c2011.
16. Maragani Narsimha, *et al.* Effect of plyometric training on agility among school football players; c2016.
17. Silvia Sedano, *et al.* effect of lower limb plyometric training on body composition, Explosive strength; c2014.
18. Abed Parseh, *et al.* studying the relationship between body mass index with speed, agility and balance in male students 13-15 years old; c2015.
19. Agility Tests. (N.D.). Fitness 2 UNETAU RSS. Retrieved; c2014. from http: fitness2u.net.aut