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Research article

# A Pilot Study on Effect of Lateral Plyometric Jumps to Improve Agility in Football Players

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## ABSTRACT

This study aimed to investigate whether football players' agility can be increased by lateral plyometric training. This pilot study involved two male football players in the age range of 15 to 25 years. The Illinois Agility Test and the Lateral Shuffle Test are the two agility tests in which all participants took part. Data from the pre-and post-tests were assessed. The study's findings indicate that lateral plyometric leaps do not increase players' agility, yet one subject's coefficient of variance did demonstrate an increase in agility following the use of lateral plyometric jumps.

**Keywords:** Lateral plyometric jumps, Agility, Football players.

## INTRODUCTION

Football is a well-known sport that is becoming more and more popular worldwide. According to FIFA, the global governing body of football, there are 203 national associations that collectively represent 200 million active players, 40 million of whom are primarily female[1]. About 1200 acyclical and unpredictable direction changes in activity, including 30 to 40 sprints, over 700 spins, 30 to 40 tackles, and jumps, are what define football. Other intense activities like slowing down, crackling, tackling, and kicking are also necessary [1]. The most frequent injury types in football are contusions, sprains, and strains, and the most common locations are the ankle, knee, thigh, and calf muscles. Researchers discovered that professional football players' injuries were around 1200 acyclical and unpredictable direction changes in activity, including 30 to 40 sprints, over 700 spins, 30 to 40 tackles, and jumps, are what define football. Other intense activities like slowing down, crackling, tackling, and kicking are also necessary. The most frequent injury types in football are contusions, sprains, and strains, and the most common locations are the ankle, knee, thigh, and calf muscles1. According to research, professional football players had 8.1 injuries for every 1000 hours of exposure. Plyometric exercises can help avoid the injuries. Plyometric exercises are made to increase muscle power through the use of jump activities, such as skipping, hopping, and jumping [2].

Researchers discovered that plyometric exercise can be modified depending on the aim of the training program and utilized at a variety of intensities, including high intensity and moderate intensity. Some plyometric activities include drop jumps and squat jumps. Plyometrics is the fast lengthening and shortening of a muscle in which stored elastic energy is employed to provide sufficient force for the muscular action. Plyometric exercises consist of three phases: eccentric, amortization, and concentric. The eccentric phase is defined as the period between mental preparation and the onset of the stretch stimuli. The amortization phase is an electromechanical delay between the eccentric and concentric

phases, followed by the concentric phase, which facilitates contraction. Plyometrics entail beginning, halting, and changing direction, which can aid in the development of agility. Agility is the ability to change direction quickly. The primary components of agility include coordination, balance, speed, and power. Agility improves body control during rapid and fast movement, enhances intramuscular coordination, and reduces the chance of injury. Football requires fast changes in both direction and speed. It puts a lot of stress on the hip adductor muscles, and strengthening them can increase the player's performance while also lowering the risk of groin injury. According to research, the hip abductors muscle has eccentric control over the hip adductors. Lateral plyometric jumps develop the lower leg muscles, particularly the hip abductors and adductors [3].

## MATERIALS AND METHODS

Four subjects volunteered to participate in the study and did not engage in any other form of plyometric exercise. Two of the four subjects quit out owing to injuries and personal concerns. A pre-test and post-test were conducted. For one month and fifteen days, perform 15 sessions of lateral plyometric jumps with a two-day rest interval between each [4, 5, 6].

**Inclusion criteria**

Subjects were aged from 15 to 25 years,

Male football players,

Willing to participate in the study.

**Exclusion criteria**

Recent trauma of lower limb,

Back, pelvic injury,

Any type of ligament reconstruction,

Not playing football for more than 9 months,

Not willing to participate in the study.

**Procedure**

All the subjects participated in 15 sessions of lateral plyometric jumps with a rest period of 2 days after every session for 1 month and 15 days that are designed for lower extremities. This training program consists of L:

Warm up (20 minutes medium speed jogging),

Self-stretching of hip abductors, adductors, hamstring, Quadriceps, Calf,

Lateral plyometric exercise (Table 1)

Cool down (10 minutes slow jogging) [7, 8].

**Table 1:** Lateral plyometric jumps

| Training Day | Training volume | Lateral Plyometric Drill | Sets × Reps | Training intensity |
|---|---|---|---|---|
| Day 1, 2, 3 | 90 | Side to side ankle hops | 2 × 15 | Low |
| | | Four quadrant jumps | 2 × 15 | Low |
| | | Lateral cone hops | 2 × 15 | Medium |
| Day 4, 5, 6 | 120 | Side to side ankle hops | 2 × 15 | Low |
| | | Four quadrant jumps | 2 × 15 | Low |
| | | Lateral cone hops | 2 × 15 | Medium |
| | | Lateral jumps over barrier | 2 × 15 | High |
| Day 7, 8, 9 | 120 | Side to side shuffle | 2 × 12 | Low |
| | | Lateral cone hops | 2 × 12 | Medium |
| | | Diagonal cone hops | 2 × 12 | Medium |
| | | Lateral jumps over barrier | 2 × 12 | High |
| | | Single leg lateral jumps | 2 × 12 | High |
| Day 10, 11, 12 | 120 | Four quadrant jumps | 2 × 12 | Low |
| | | Side to side shuffle | 2 × 12 | Low |
| | | Lateral cone hops | 2 × 12 | Medium |
| | | Diagonal cone hops | 2 × 12 | Medium |
| | | Single leg lateral jumps | 2 × 12 | High |
| Day 13, 14, 15 | 100 | Side to side shuffle | 2 × 10 | Low |
| | | Lateral cone hops | 2 × 10 | Medium |
| | | Diagonal cone hops | 2 × 10 | Medium |
| | | Single leg lateral jumps | 2 × 10 | High |
| | | Lateral jumps over barrier | 2 × 10 | High |

**Instruments**

The Illinois agility test was used to assess the players' abilities to run, turn, accelerate, and decelerate. In this test, the track is 10 meters long and 5 meters wide. Four cones are used to indicate the beginning, end, and two turning points. Another four cones are set down the center, equally spaced apart. The cones in the center are spaced 3.3 meters apart. The subjects should lie on the first cone. On the go command, the athlete stands up as quickly as can and goes forward 10 meters to run around a cone, then back 10 meters, and finally up and down a four-cone slalom course.

Finally, the athlete runs a further 10 meters up and back past the finishing cone, at which point the clocking stops. Out of three trials, the best score is recorded [9].

The lateral shuffle test is also used to assess the athlete's ability to shuffle in the lateral direction. Three cones are put in a line four feet apart (8 feet total). The starting position is at the center cone. The participant shuffled from

side to side (left, center, and right) for 10 seconds after receiving the signal 'go'. Participants were instructed not to cross their feet during the test, and if they did, the trial was dismissed. Each test started on the left side. Out of three trials, the highest score is recorded [10, 11].

## RESULTS

### Illinois Agility test

**Table 1:** t-Test: Paired Two Sample for Means Paired sample T-test, using T distribution (df=1) (two-tailed) (validation)

| t-Test: Paired Two Sample for Means | | |
|---|---|---|
| | **Variable 1** | **Variable 2** |
| Mean | 19.53 | 19.215 |
| Variance | 3.2768 | 3.51125 |
| Observations | 2 | 2 |
| Df | 1 | |
| t Stat | 7 | |
| P(T<=t) two-tail | 0.090334 | |
| t Critical two-tail | 12.7062 | |

$H_0$ hypothesis: Since p-value (0.09033) > α (0.05), $H_0$ cannot be rejected. The average of after minus be fore's population is assumed to be equal to the μ0. Particularly, the difference between the average of after minus before and the μ0 is not big enough to be statistically significant.

### Lateral Shuffle test

**Table 1:** t-Test: Paired Two Sample for Means, Paired sample T-test, using T distribution (df=1) (two-tailed) (validation)

| | **Variable 1** | **Variable 2** |
|---|---|---|
| Mean | 12.5 | 12 |
| Variance | 4.5 | 2 |
| Observations | 2 | 2 |
| t Critical one-tail | 6.313752 | |
| P(T<=t) two-tail | 0.874334 | |
| t Critical two-tail | 12.7062 | |

$H_0$ hypothesis - Since p-value (0.8743) > α (0.05), $H_0$ cannot be rejected. The average of after minus before's population is assumed to be equal to the μ0. Particularly, the difference between the average of after minus before and the μ0 is not big enough to be statistically significant. Hence, it is seen that there is no impact of lateral plyometric jumps on agility in football players.

But, as per CV (Coefficient of variance); one subject shown more improvement after the use of lateral plyometric jumps [Illinois Agility test: Pre-test (2.618) and Post-test (2.327); Lateral shuffle test: Pre-test (5.41) and Post-test (4.56)]

## DISCUSSION

Many studies on overall plyometric training have demonstrated improvements in agility and performance, but only a few studies have been conducted on lateral plyometric jump training. The current study sought to assess the impact of lateral hops on football players' agility.

The findings of this study confirm the null hypothesis that lateral plyometric jumps do not improve performance on the Illinois agility and lateral shuffle tests. However, according to CV (Coefficient of Variance), one participant showed improvement in agility after using lateral plyometric jumps, but the other individual showed improvement in agility on the Illinois test. A greater sample size will produce different results.

In a prior study, the authors investigated the effects of plyometric training on agility. All subjects participated in a 6-week plyometric training program, and all training groups shown substantial improvements when compared to the non-experimental group. However, the current investigation fails to demonstrate a significant improvement in agility. This could be due to a tiny sample size. A study with a higher sample size may yield significant results.

A study was undertaken on plyometric exercise to determine its impact on developing power and agility. This study studied the effects of three weeks of plyometric exercise on agility and jump performance and discovered a considerable improvement. However, the study's duration was shorter.

The study recommends increasing the sample size to include both male and female subjects.

## CONCLUSION

Plyometrics training can help football players enhance their agility. The current study found that football players improved their agility through plyometric exercise, although the results were not statistically significant.A greater sample size may indicate improvement in agility among football players.

**Ethical clearance** Ethical clearance was obtained from Institutional ethical committee.

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