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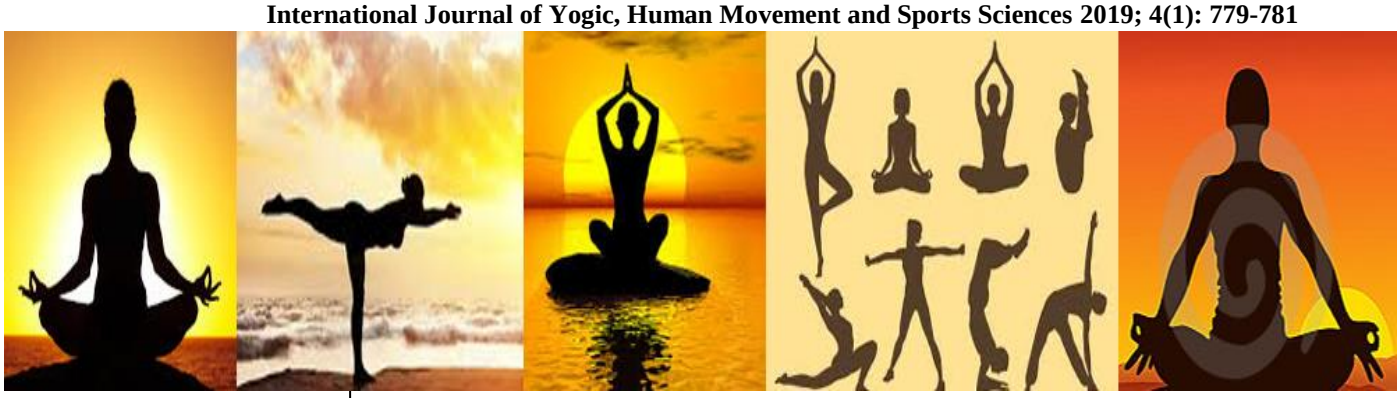

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Impact of ladder training on the agility performance of footballers

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Abstract
As per the reviewed literature that the implementation of ladder drills on a training program are one of the methods used to improve the agility performance. However, to date, no study was carry out to determine the effectiveness of ladder drills training only in increasing agility performance. Thus, the purpose of this study was to find out the effects of ladder drills training among football players of Sree Sankaracharya University of Sanskrit. Thirty students of football players of Sree Sankaracharya University of Sanskrit (N = 30) with mean age (M = 21.20 ± 1.16) years, their height (M = 168.13 ± 8.27) cm and weight (M = 61.70 ± 9.55) kg were recruited by using the method of purposive sampling. They were randomly assigned to ladder drills training group (N = 15) and the control group (N = 15). The ladder drills training group underwent 4 weeks of training session (15-50 min/day, 3 days/week). The agility performance was measured with agility t-test where the result were taken and recorded twice. The results had shown that ladder drills training induced significant improvement (t = 15.33, df = 14, p < .05) on agility t-test. There were significant differences of the agility performance between the experimental group and the control group (t = 4.74, df = 28, p < .05) during post-test. The results revealed that the ladder drills training is a feasible method to enhance the agility performance.

Keywords: Ladder drills training, agility performance, football

Introduction
Football world is eagerly searching for new training methods that will enhance their performance and give them an edge in the competition. Many sports performed on a court or on a field require high-speed total body movements. Many of these are in response to the motion of a ball, opposition players, or teammates. This important component of athletic performance may be described as agility, and it is sometimes grouped together with terms such as speed and quickness. Agility has historically been related to the ability of an athlete to display high levels of speed with the inclusion of directional changes (Holding, Meir, & Shi, 2013) [2]. Recently, researchers have noted that movement displayed in sport is primarily governed by stimuli within the environment, and thus an athlete's ability to perceive changes and respond accordingly will greatly impact upon the athlete's movement speed and efficiency (Holding, Meir, & Shi, 2013) [2]. As a result, the definition of agility has been updated to "a rapid whole-body movement with change of velocity or direction in response to a stimulus". This definition therefore includes both the perceptual and physical components of agility.
Agility is important in maximize athletic performance. Agility requires the athlete to coordinate several activities including the ability to react and start quickly, accelerate, decelerate, move in the proper direction, and maintain the ability to change direction as rapidly as possible while maintaining balance and postural control. The athlete must adapt to the environment, react quickly, adjust bodily position accordingly, and transition from one skill to another as efficiently (Ratamess, 2012) [6]. Moreover, as it strengthens the muscles and tendons of all major joints it will aid in preventing injuries by improving body control through repetition of proper movement mechanics. Also, it will evade other athletes on the field or court, maintain the proper position to catch, strike, and kick a ball, and maintain the proper position to block or tackle an opponent (Ratamess, 2012) [6]. To improve agility, coach often uses the agility ladder to drills the athlete's footwork in enhancing their athlete performances. According to, it uses a piece of equipment that resembles a rope ladder that has been placed on

the ground and players use it to do drills requiring them to quickly jump into and out of the squares of the ladder. These drills help players work on moving their feet quickly while maintaining their balance, which is critical for fielding and running down the base path. Ladder drills also increase neural connections with foot movements that mimic the quick thinking that players must do when hitting or fielding. In modern days, we can get the agility ladder from sport manufacturing. Agility ladder is made up of two nylon straps with plastic rungs spaced apart about 15-18 inches, depending upon the training purpose. Also, the agility ladder can be made at home using supplies from your local hardware store (rope and PVC pipe), or simply made by a tape by taping the floor accordingly like an agility ladder. This agility ladder is a very popular piece of equipment for coaches looking for ways of improving their speed, coordination, balance, and agility. Ladders can be used for variety of purposes. The two most obvious purposes are increased foot speed and coordination. By improving these qualities, your athletes will develop better footwork and improve their overall athleticism. To get the most out of your ladder drills, it is important to progress from easy drills to more advances. Furthermore, compelling different moves through agility ladder simulators the movements required during competition Ladder training is active and indispensable to increase foot speed, agility, timing and coordination for the athlete. This training should be specific togame situations (Srinivasan & Saikumar, 2012) [8]. For example, badminton players can perform side steps with a speed ladder and comeback the shuttlecock. A player can also sprint towards a box, coming back the shuttlecock, backtrack towards another box and return the shuttlecock again. Ladder training allows coaches and players to be imaginative and these drills can also give a lot of pleasant(Srinivasan & Saikumar, 2012) [8].

Methodology

Experimental method was applied in this research. A ladder drills training program was designed to the experimental group (n = 15 subjects) and control group (n = 15 subjects). The ladder drills training program was conducted in a period of 6 weeks, three session per week (Monday, Wednesday and Friday), duration training for 30 minutes per day, with a total of 18 sessions of ladder drills training. Subjects The subjects of this research were recruited using purposive sampling from the undergraduate football players of Sree Sankaracharya University of Sanskrit. A total of 30 students (n = 30) were recruited to become the subjects of this research. They were randomly divided into two groups, the experimental group (n = 15) and the control group (n = 15) which respectively with a total of 15 subjects (8 males &7females) in the experimental group and 15 subjects (9 males &6females) in the control group. The subjects (n = 30) with the age (M = 21.20 ± 1.16) years, their height (M = 168.13 ± 8.27) cm and their weight (M = 61.70 ± 9.55) kg.

Test Administration

For agility assessment, the agility t-test was used as the instrument of this research to assess the agility of the subjects. The agility t-test is one of the common tests. It is used in many collegiate sport programs, and in laboratory methods classes in exercise science and physical education academic programs in the United States. This test is best suited for athletes in sports that require sprint forward, move laterally, and backpedal. This test has a test-reliability range of .93 to .98 (Miller, 2012) [4]. This test was conducted twice which were pre-test and post-test to compare the agility performance of the experimental group before the ladder drills training and implementation of the ladder drills training and also the agility performance of the control group without any implementation of ladder drills training. Firstly, the subjects were required to carry out a gentle warm up and light stretching exercises focusing on lower limbs for at least 5 minutes before undergo the test. According to Prentice (2007) [5], the warm up routine increase body core temperature, stretches ligaments and muscles, and increase flexibility. Warm-up routines have been found to be important in reducing injury and muscle soreness (Prentice, 2007) [5]. After the warm up section, the subject gets ready at the starting point of agility t-test. According to Raya *et al*. (2013) [7], the T-test was administered using a version standardized from previous literature. The units of measurement were changed from yards to meters, creating a 10 x 10 m course. The course procedure of having the participant touch each cone is not standardized in the literature; therefore, the task was eliminated. The directions adopted for this study were based on Miller *et al*. (2006) [3]. On the "go" command, the participant (1) ran or moved as quickly as possible forward to the center cone, (2) sidestep to the right 5 m to the right cone, (3) sidestepped to the left 10 m to the far left cone, and then (1) sidestepped back to the right to the center cone. The participants then ran or moved backward as quickly as possible to cross the finish line (Miller *et al*., 2006) [3].

The raters began the stop watch on "go" and stopped when the participant broke the plane of the finish line. The time to complete each trial was recorded in seconds. Disqualification was determined if the participant failed to run the course as instructed, failed to reach the finish line or complete the course, moved any cones, did not keep his trunk and feet pointed forward at all times, or crossed his legs more than once when sidestepping. If a participant did not complete a trial successfully, a score of 0 was given. A digital timing gate (positioned at 0 m) was used to measure performance. The aim was to complete the course in the fastest possible time with the best of 3 trials recorded and used for statistical analysis. After the test, the subjects required to carry out a cool-down period included stretching activities as was done during the warm up routine. The cool-down period prevents pooling of blood in the arms and legs, thus maintaining blood pressure and enabling the body to cool and return to a resting state (Prentice, 2007) [5]. Furthermore, according to Prentice (2007) [5], experience and observation indicate that people who stretch during the cool-down period tend to have fewer problems with muscle soreness after strenuous activity. Procedure Purposive sampling of 30 subjects from football players of Sree Sankaracharya University of Sanskrit were chosen became the subjects for this study. The totals of thirty subjects were equally divided into two groups which are control group (without any implementation of ladder drills training) and experimental group (with implementation of ladder drills training). They were briefed about the whole procedures identified prior to the study carried out. Additionally, they were informed of the potential risks and benefits and signed an informed consent form. Subjects were assured that individual data were going to be kept confidential. To insure anonymity of subjects and confidentiality of data, subjects were assigned a study number and collected data was entered in a SPSS program. They were instructed that their participation in the study was voluntary, and they could withdraw from the study at any time with no repercussions. Both experimental group and the control group

of this research were instructed to do a pre-test by using the agility t-test to test their agility before the experimental group started the 18 sessions of ladder drills training intervention. The ladder drills training intervention was only given to the experimental group of this research, whereas the control group of this research was instructed to continue their normal dietary and physical activity practices throughout the experiment. Subjects were also instructed to refrain from any exercise aside from activities of daily living. The ladder drills training frequency consisted of 18 sessions of training spread over 6 weeks' time (30 min/day). The subjects underwent a one week testing period at the beginning (pre-test) and at the end (post-test) of the experimental period. This training started after one week of pre-test and consistently training was given to the experimental group throughout the training intervention. Before the implementation of the designed training, subjects of the experimental group were received a walkthrough of the training procedures during the subject orientation period. During the orientation it was determined whether subjects were eligible to participate in the study and find out the baseline of the intensity of the ladder drills training. Intensity refers to the complexity and loading involved in the drill. Drills can be categorized based on intensity. Although all drills are performed with maximal quality of effort, the intensity increases with complexity and external loading. The experimental group was given 18 sessions of training, each training session consisted of different ladder drills in each phase, follow by 2 minutes rest then end the training session after the subjects had completed 3 sets of each drills in the first week of training sessions. For the first week, the subjects will be given an introduction and easy complexity of drills. The second and third week training, overload is applied on the training session where the intensities of ladder drills training are increase to moderate intensity of drills. Lastly, the fourth week of training intensity also gradually increased to hard intensity which means the complexity of the chosen ladder drills more difficult and required agility in random reaction tasks.The intensity of drills are increasing week by week while the sets of drills are maintained to 3 sets. The following table shows the details of ladder drills training sessions in 6 weeks.

Discussion

The purpose of this study was to examine the impact of 6 weeks ladder drills training on agility performance of football players. The major finding of this study was that implementation of 6 weeks of ladder drills training program for the experimental group (n =15; male =9; female =6) induced a significant differences ($t = 15.33$, $df = 14$, $p < .05$) on their agility performance. The mean of the post test of the agility performance for the experimental group ($M = 11.19 \pm 0.70$) was significantly increased compared to the pre-test ($M = 12.24 \pm 0.68$). The results mean that 6 weeks of ladder drills training program were able to improve the agility performance of the experimental group. Majority of the subjects had experience in sports more than 3 years. There were 19 subjects (63.30%) had experience in sports more than three years, 6 subjects (20.00%) were had one year experience in sports, 3 subjects (10.00%) had experience in sports of three years. These findings indicated that ladder drills training was able to increase the agility performance of the trained individuals. These findings supported the extensive meta-analysis which concluded that progression in agility training can be viewed similarly where the athlete masters basic drills, improves his/ her times in these drills, and progresses to more complex drills (Ratamess, 2012) [6]. Upon progression, basic drills can still be used aspart of the program to maintain the athlete's performance level of these drills (Ratamess, 2012) [6]. Furthermore, from the results of this study expressed that there were significant differences of the agility performance between the experimental group and the control group during post-test ($t = 4.74$, $df = 28$, $p < .05$). The findings also had shown a significance mean difference between the experimental group and the control group. The results expressed that the post-test result of the experimental group ($M = 11.19 \pm 0.70$) and for the control group ($M = 12.38 \pm 0.69$). Therefore, the results indicated that the agility performance of the experimental group was significantly higher than the agility performance of the control group after four weeks of ladder drills training. The results supported ladder drills can help the athlete to coordinate several activities including the ability to react and start quickly, accelerate, decelerate, move in the proper direction, and maintain the ability to change direction as rapidly as possible while maintaining balance and postural control which required in agility performance (Ratamess, 2012) [6]. Moreover, it also proved the ladder is a time-tested and proven effective tool for improving our foot work because of the training effect is similar to jump rope, but with several advantages (Dhanaraj, 2014) [1].

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