

Effectiveness of Ladder Training Versus Plyometric Training Program on Agility in Kabaddi Players

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ABSTRACT

Background: Sport specific training in Kabaddi players should also focus on agility in consistent with demand of the sport. Since Ladder training and Plyometric training improves agility, it can be useful training strategy to improve the performance of Kabaddi players. Ladder training is more effective and also help the player to catch, strike, and to block or tackle the component, whereas Plyometric training enhances balance and control of body positions during game.

Methodology: A comparative study design had made use of Quasi experimental approach by convenience sampling to select 60 samples of semiprofessional Kabaddi players in the age of 18- 25 students of both genders studying in KIMS College of Physiotherapy, Amalapuram. On certain predetermined criteria with a formal written consent samples were taken. The data was gathered following Interventions using Ladder training and Plyometric training protocol which was administered on the Kabaddi players. The outcome measures were assessed before the intervention and at the end of Eighth week. The standardized tool named Agility T-test was taken to assess the Agility before and after the intervention.

Result of the Study: The result of the study indicated that Ladder training is a useful training strategy to improve agility more in Kabaddi players than Plyometric training programme. Whereas level of significance taken is $P < 0.05$. And obtained level of significance $P < 0.00$.

Conclusion: This study concluded that Ladder training is a useful training strategy to improve agility than Plyometric training programme in Kabaddi players.

Key Words: Agility, Ladder Training, Plyometrics, Kabaddi.

INTRODUCTION

The world of games and sports has crossed many milestones, as a result of different achievements in general and their application in the field of sports in particular. Scientific investigation into performance of sportsman has been playing an increasingly importance role to attain excellence of performance in different sports. ^[1]

Kabaddi is the ancient outdoor game played in India. It is the high intensity intermittent type of sport which requires a

well-built physique. The word Kabaddi is derived from a Tamil word Kai - pidi, literally meaning "(let's) Hold Hands", which is indeed the crucial aspect of play. It is the state game of Tamil Nadu, Punjab and Andhra Pradesh in India. ^[2]

In Kabaddi, the specific fitness is needed with reference to strength, sprint and agility, which equip the athlete to face the physiological and psychological challenges that come his way in his competitive sports career. It requires tremendous physical stamina, aerobic fitness, anaerobic fitness,

dynamic balance, agility, individual proficiency, neuromuscular coordination, lung capacity, quick reflexes, intelligence and presence of mind on the part of both attackers and defenders. [3]

Kabaddi needs a small playing area, 14 players (seven on each side) take part and no equipment is required. The dimensions of the playing field are 12.5 x 10m (for adults) divided by a mid-line into two equal halves (each 6.25 x 10 m). The game is supervised by a referee, two umpires and a scorer. The side winning the toss has the option of sending their raiders first, or choosing a particular side. The raider takes the maximum possible inspiration and then moves to the other side of the field, uttering a continuous chant 'Kabaddi' without any further inspiration, try to touch one of the defending players. The defenders try to hold the raider within their area and the raider tries to force his way back to his own side without discontinuing the chant. If the raider is able to come back to his area after touching a defender a point is credited to his group and the person touched is put out of the game [4].

In kabaddi motor fitness is the ability of the neuromuscular system to perform specific tasks. Fundamental motor skills are common motor activities with specific observable patterns. Most skills used in sports and movement activities are advanced versions of fundamental motor skills. Motor fitness is a more comprehensive term which includes five motor performance components such as power, speed, agility, balance and reaction time, which are important mainly for success in sports [2].

In kabaddi players require motor, physical and physiological components for achieving their goal.

Agility is the ability to change direction rapidly and accurately. The term "quickness" used interchangeably for both agility and change of direction and speed. Quickness has been identified as "a multi-planar or multidirectional skill that combines acceleration, explosiveness and

reactive" this definition suggests that quickness consists of cognitive and physical reactive abilities and explosive acceleration [5]. Kabaddi players require agility in executing the movement in faster manner while riding and catching [2].

TABLE - A: CLASSIFICATIONS OF AGILITY [5]

Agility Classification	Definition
Simple	No spatial or temporal uncertainty
Temporal	Temporal uncertainty, but movement is pre planned (spatial confidence)
Spatial	Spatial uncertainty, but timing of movement is pre planned (temporal confidence)
Universal	Spatial and temporal uncertainty

LADDER TRAINING:

Ladder training are used to improve foot work in maximizing athletic performance. [6] It is the multi directional training which helps to improve strength, power, balance, agility, coordination, proprioception, core and joint stability, foot speed, and mobility. [7]

Ladder drills is very much fun to perform the task on ladder. The training sessions in it will helps to achieve various above objective by performing drills in a rhythm and teaching the body and mind various foot combinations [7]. To improve performance level in footwork and coordination. Ladder drills will help the player to catch, strike, and to block or tackle the component [8].

PLYOMETRIC TRAINING:

Plyometric training is popular among individuals involve in dynamic sports and plyometric exercises such as jumping, hopping, skipping and bounding are to improve dynamic muscular performance. Plyometrics 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. Plyometric training to improve in vertical jump performance, acceleration, leg strength, muscular power, increased joint awareness and over all proprioception. [9]

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. The program accomplishes specific goals through manipulation of four variables intensity, volume, frequency, and recovery.^[9]

Plyometric training is techniques used by athletes in all types of sports to increase strength and explosiveness. It consists of a rapid stretching of a muscle (eccentric action) immediately followed by a concentric or shortening action of the same muscle and connective tissue^[3]. The stored elastic energy within the muscle is used to produce more force that can be provided by a concentric action alone^[10].

The fundamental principle of the plyometric method lies in the speed of the shift from and to the eccentric and concentric muscle contractions. "The key to this lies in the time needed for one muscle to shift from a state of flexibility (the stretch) into a state of shortening (the return to its original position). The measurement, the extent of the stretch (the degree), determines the use of the strength that allows flexibility and the transformation of chemical energy into energy used to move muscles"^[10]. Plyometric training can contribute to improvements, acceleration, leg strength, muscular power, increased joint awareness and overall proprioception for kabaddi players^[3].

MATERIALS AND METHODS

STUDY APPROACH: The research approach adopted was Quasi Experimental study.

STUDY DESIGN: This is a pre-test and posttest experimental study design.

STUDY SETTING: This study was conducted in KIMS college of Physiotherapy, Amalapuram. under the supervision of team trainer and P.E.T trainer. Informed consents were obtained from all the participants.

SAMPLING METHOD: Semi-professional Kabaddi players with an age between 18-25 years were selected by simple convenient sampling method.

SAMPLE SIZE: A total of 60 semi-professional kabaddi players who fulfilled the inclusion criteria were assigned as Group A (n=30) were underwent Ladder training. and Group B (n=30) were undergoing Plyometric training programme.

STUDY DURATION: This study was carried out for 1year duration.

TREATMENT DURATION: The training duration was 8 weeks.

Group A Ladder training: Players practiced Ladder training for 60 minutes thrice a week for 8 weeks.

Group B Plyometric training: Players practiced Plyometric training program for 60 minutes thrice a week for 8 weeks.

INCLUSION CRITERIA:

- Age between 18 to 25 years
- Semi-professional players
- Both genders
- Players interested to participate in training protocol

EXCLUSION CRITERIA:

- Players with any lower limb injuries
- Players with history of any chronic diseases.
- Players with history of any congenital deformities
- Player with any respiratory complications

MATERIALS USED: Stop watch, measuring tape, Cones – 4, Pen, Document sheet, Ladder up to 2 nylon straps with plastic rungs 15-18 inches apart depends up on training purpose, Rings, Boxes.

Outcome measures:

- Agility T-test (Standardized Tool).

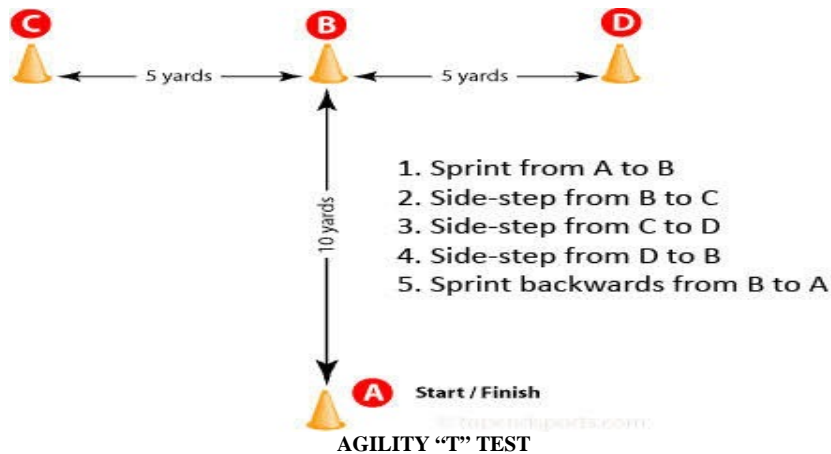
ASSESSMENT PROCEDURE

MEASUREMENT TOOLS:

Agility "T" test: The T-Test is a test of agility for athletes that includes forward, lateral and backward running. Set out four cones (5 yards = 4.57 m, 10 yards = 9.14

m). The subject starts at cone A on the command of the timer, the subject sprints to cone B and touches the base of the cone with their right hand. They then turn left and shuffle sideways to cone C, and also touch 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. Then they shuffle back to cone B touching

with the left hand, and run backwards to cone A. The stopwatch is stopped as they pass cone A. The trial will not be counted if the subject crosses one foot in front of the other while shuffling, fails to touch the base of the cones, or fails to face forward throughout the test. Take the best time of three successful trials to the nearest 1/10th of seconds.



TRAINING PROCEDURE

LADDER TRAINING:

There are 3 different types of drills.

- The first type of drills are steady state drills. These drills focus on quickness endurance and utilize a constant rhythm throughout the ladder
- The second types of drills are burst drills. These drills focus on the ability to turn on rapid burst of foot movement.

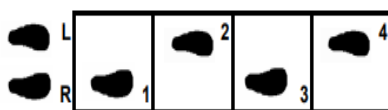
- The third types of drills are elastic response drills. These drills focus on improving the reactive speed components of the lower leg.

A standard agility ladder is 15 feet long and 20 inches wide

LADDER DRILLS [41]

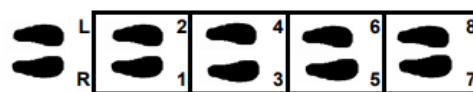
1 Foot In Each

Start behind the ladder facing down it. Lead with either foot stepping 1 foot per square.



2 Feet In Each

Start behind the ladder facing down it. Step with either foot into the first square, followed by the second foot into the same square. Repeat the drill leading with the other foot.



1 In Lateral

Start by facing to the side with one foot in and one foot out. Lead with the foot that is in the ladder and step into the next square. Follow with the trail leg by placing that foot into the first square. Repeat the exercise leading with the other foot.



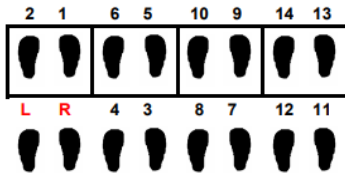
2 In Lateral

Start by facing to the side with both feet outside the ladder. Step into the first square with the closest foot, followed by the second foot. Repeat the exercise leading with the other foot.



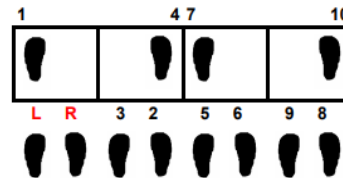
In In Out Out

Start by facing the ladder from the side. Step with the inside foot (foot on the long side of the ladder) into the first square followed by the second foot. Step back out with the inside foot to the side of the second square followed by the other foot. Repeat the exercise leading with the other foot.



In Out Out

Start by facing the ladder from the side. Step with the outside foot into the first square. Step to the side of square two with the inside foot. Step back out of square one with the outside to the outside of square two. Step with the inside foot into square two. Repeat the exercise leading with the other foot.



X-Over Lateral

Start at the end of the ladder facing to the side. Begin with the outside foot slightly in front of the inside foot. Cross the outside foot over in front and into the first square. Next step the inside foot into the first square. Repeat the exercise leading with the other foot.



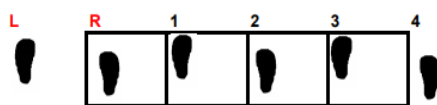
Carioca In Each

Start at the end of the ladder facing to the side. Begin with the outside foot slightly in front of the inside foot. Step across the front into the first square with your outside foot. Trail with your inside foot into the same square. Step behind into the next square with your lead foot followed by your right foot.



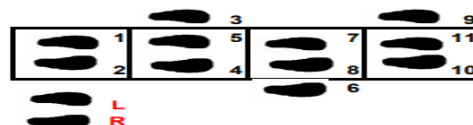
Carioca Every Other

Start by facing to the side with one foot in and one foot out. Begin with the outside foot slightly in front of the inside foot. Step across the front into the first square with your outside foot. Trail with your inside foot into the second square. Step behind into the next square with your lead foot followed by your right foot into the next square.



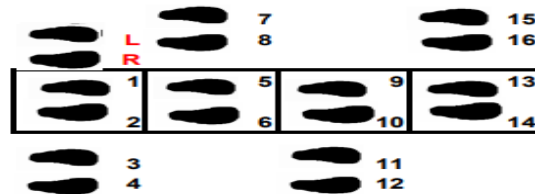
Key Shuffle

Start by facing down ladder and to the side. Using a 1-2-3 rhythm, step into the first square with the inside foot, followed by the outside foot. Next, step to the outside of the second square with the lead foot. Now step into the second square with the trail foot. Step with the lead foot into square two. Repeat the exercise leading with the other foot.



X-Over Zig Zag

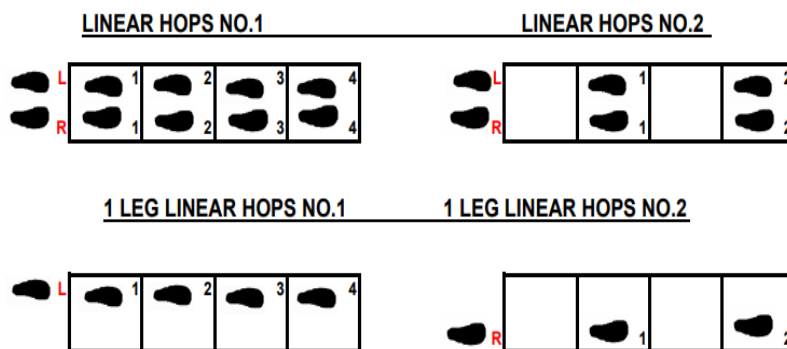
Start by facing down ladder and to the side. Step into the first square with the outside followed by the inside foot (across the front of the body). Step to the outside of the first square with the lead foot followed by the trail foot. Step into the second square with the lead foot followed by the trail foot. Repeat the exercise leading with the other foot.



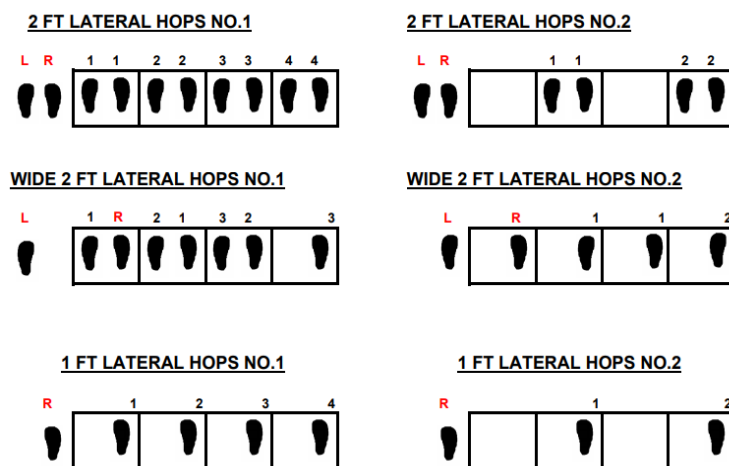
Linear Response Drills

As the name suggests, these drills are primarily linear in nature. They advance in complexity by progressing from a square-to-square pattern to every other square pattern. This is then performed on a single leg. Each variation increases the intensity of the response.

ELASTIC RESPONSE: LINEAR



ELASTIC RESPONSE: LATERAL



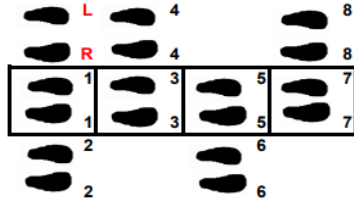
These drills are characterized by their significantly lateral movement.

As with the linear response drills, the lateral response drills are progressed by skipping a square and by utilizing a unilateral stance.

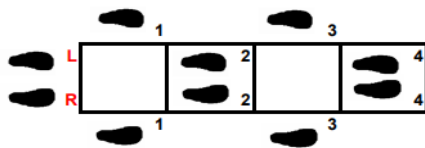
Linear/Diagonal Response Drills

These drills are performed facing down the ladder, but utilize a lateral, or diagonal, movement pattern. Despite the name, each drill focuses on lateral movement. The concentration should be on a side-to-side push, with an added linear movement component.

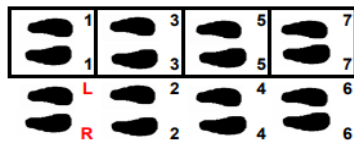
ZIG-ZAG PATTERN NO.1



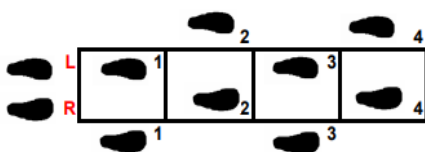
HOP SCOTCH PATTERN NO.1



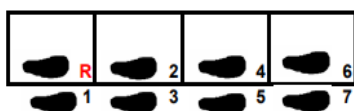
LATERAL HOP PATTERN NO.1



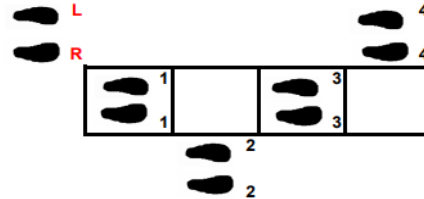
SIDE TO SIDE LINEAR HOPS



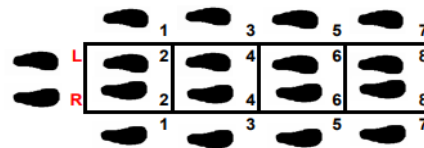
1 LEG SIDE TO SIDE HOPS NO.1



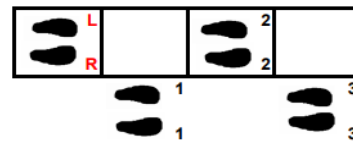
ZIG-ZAG PATTERN NO.2



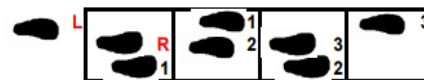
HOP SCOTCH PATTERN NO.2



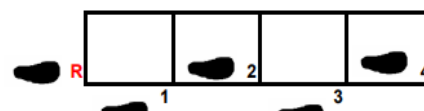
LATERAL HOP PATTERN NO.2



LINEAR SCISSORS



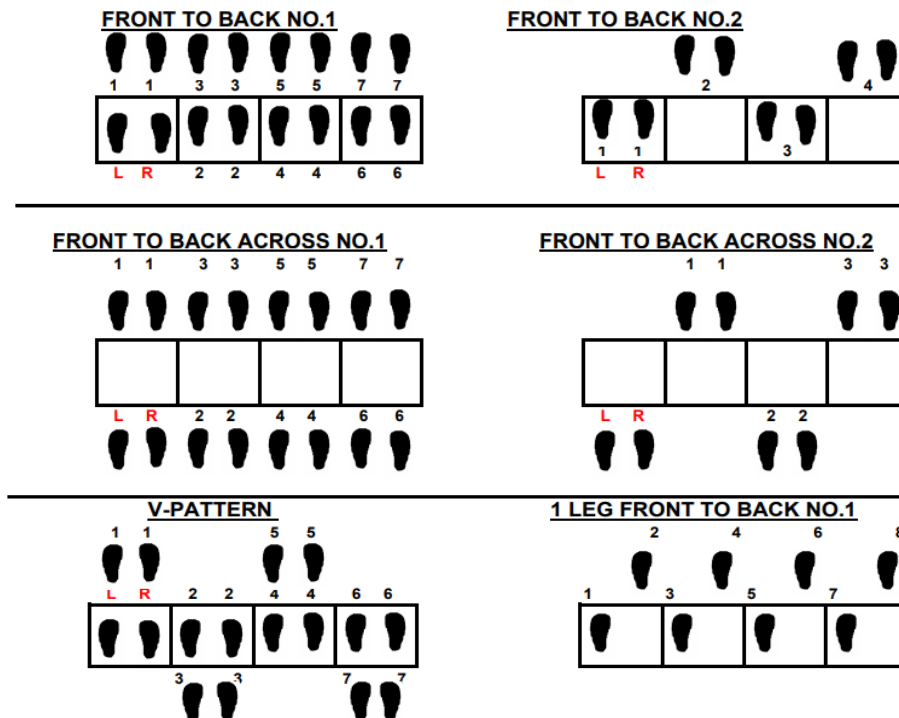
1 LEG SIDE TO SIDE HOPS NO.2



Lateral/Diagonal Response Drills

The body does move laterally down the ladder, the primary movement pattern in front to back.

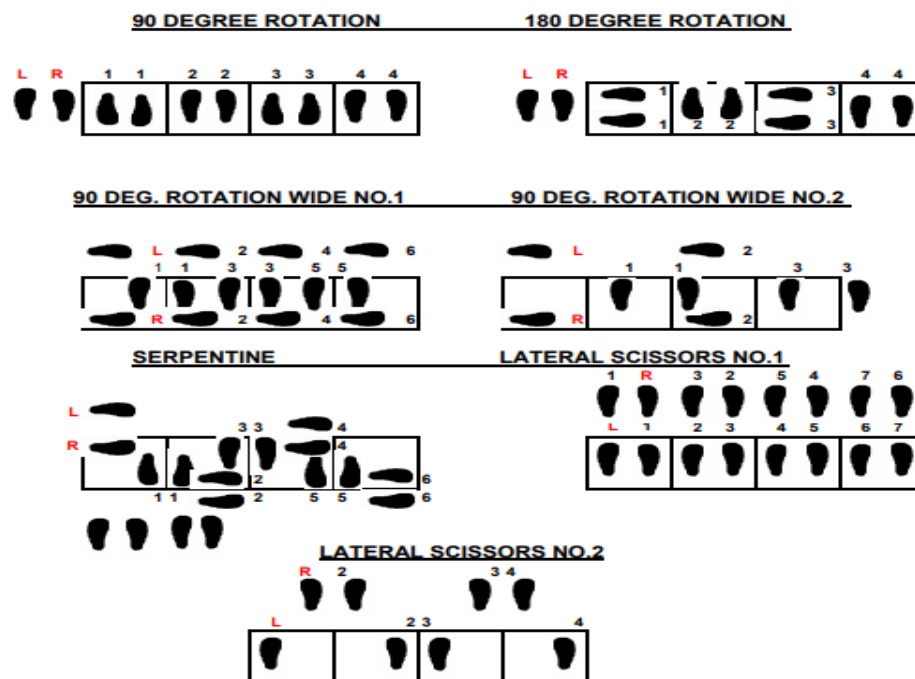
ELASTIC RESPONSE: LATERAL/DIAGONAL



Rotational Response Drills

These drills utilize a large rotational component. Once again, these drills can be progressed by skipping a square, or by increasing the degree of the rotation.

ELASTIC RESPONSE: ROTATIONAL



LADDER TRAINING PROTOCOL:

In this Three week we are going under workout process

1st Week:

- IN IN OUT OUT IN
- LATERAL SCISSORS

- LATERAL X OVER
- 1 FOOT LATERAL
- 1 FOOT LINEAR

2nd Week:

- Z DRILL
- IN IN OUT OUT LATERAL
- ICKEY SHUFFLE
- IN OUT OUT

3rd Week:

- Rep the 1st and 2nd week training.

4th Week: PROTOCOL NO. 1: LEVEL 1

- WALK THRU-SHUFFLE LEFT
- WALK THRU-SHUFFLE RIGHT
- SHUFFLE LEFT
- SHUFFLE RIGHT
- IN IN OUT OUT LEFT
- IN IN OUT OUT RIGHT
- ROTATIONAL TWIST LEFT
- ROTATIONAL TWIST RIGHT

5th Week: PROTOCOL NO. 2: LEVEL 1

- SHUFFLE LEFT
- SHUFFLE RIGHT
- SHUFFLE COACH COD
- IN IN OUT OUT LEFT
- IN IN OUT OUT RIGHT
- IN IN OUT OUT COACH COD
- ROTATIONAL TWIST RIGHT
- ROTATIONAL TWIST LEFT

6th Week: PROTOCOL NO. 3: LEVEL 2

- 1 FOOT IN EACH
- 2FT LT 1ST
- 2FT RT 1ST
- UP AND SWITCH 1 IN EACH
- UP AND SWITCH 2 IN EACH
- HOP SCOTCH IN ON ALL
- HOP SCOTCH EVERY OTHER
- ICKEY
- 1 FOOT HOP LEFT
- 1 FOOT HOP RIGHT

7th Week: PROTOCOL NO. 4: LEVEL 2

- 2 FT LEFT 1ST
- 2 FT RIGHT 1ST

- 2 FOOT JUMPS
- ALT 1 FT JUMPS
- UP AND SWITCH
- HOP SCOTCH
- ICKY SHUFFLE
- 1 FT HOPS LT
- 1 FT HOPS RT

8th Week: PROTOCOL NO. 5: LEVEL 3

- 2 IN LATERAL
- 1 IN LATERAL
- IN IN OUT OUT
- IN OUT OUT
- X-OVER LATERAL
- CARIOCIA
- SNAPIOCIA

PLYOMETRIC TRAINING (GROUP B)

- a) Warm up: 15 minutes
 - Jogging
 - Stretching
- b) Plyometric training: 30 minutes
- c) Cool down: 15 minutes
 - Soft jogging
 - Stretching

Illustration of each exercise included in the plyometric training program.

Lateral cone hop: Lateral jumping as high as possible above the cones (height: 0.3 m) by keeping the legs straight and the feet ready for the landing before jumping again as quickly as possible.

Bounding: Spread the legs open as broad as the shoulders and carry out fast and successive jumps by keeping the same space between the feet.

Skipping: Jump as high as possible on each leg while raising the knee.

Box jump: Four 0.4-m boxes were placed in parallel and spaced 1.50-m apart. Subjects started on the first box and performed three maximal rebounds, as quickly and high as possible, after dropping from the box. They had to touch the ground with the balls of the feet only.

Squat lunge: With aligned feet, descend the posterior leg towards the floor keeping the

knee of the anterior leg right in the vertical axis of the toes.

Step-up: Climb a stair step (height 0.4 m) in an explosive way.

Rim jump: Jumping with straight legs and straight arms successively.

PLYOMETRIC TRAINING PROTOCOL [42]

	Week 1	Week 2	Week 3	Week 4	Weeks 5-7	Week 8	Rest (min)
Lateral cone hop	-	1 × 10	1 × 10	2 × 10	2 × 10	2 × 10	2
23 m bounding	-	-	1 × 1	1 × 1	2 × 1	2 × 1	2
23 m skipping	-	1 × 1	1 × 1	2 × 1	2 × 1	3 × 1	1
Box jump	-	-	1 × 10	1 × 10	2 × 10	2 × 10	4
Squat lunge	2 × 10	2 × 10	2 × 10	3 × 10	3 × 10	3 × 10	1
Step-up	2 × 10	2 × 10	2 × 10	3 × 10	3 × 10	3 × 10	1
Rim jump	-	1 × 10	2 × 10	2 × 10	2 × 10	2 × 10	4

Number of sets x number of repetitions is presented for each session of week 1 – 8. Rest is the rest interval between sets.

STATISTICAL ANALYSIS

The collected data were tabulated and analyzed using descriptive and inferential statistics. Mean and standard deviation were used to assess all the parameters of the data using Microsoft Excel 2007. Paired t-test and Unpaired t test was adopted to find out the effectiveness of Ladder training versus Plyometric training programme on Agility in Kabaddi players.

STATISTICAL TOOL

Paired t-test was used to find out the difference in the pre-test & post-test scores within the groups.

Table 1: COMPARISON OF PRE AND POST TEST ON AGILITY IN GROUP A WHO UNDERWENT LADDER DRILLS IN KABADDI PLAYERS.

	Mean	N	S.D	Std. error	Sig
Pre test	10.947	30	0.501	0.091	.000
Post test	10.377	30	0.449	0.082	

In this table p value is less than 0.05 which shows that there is a significant difference between Pre and Post Agility T-test in group A who underwent Ladder drills in Kabaddi players. P<0.05

Table 2: COMPARISON OF PRE AND POST TEST ON AGILITY IN GROUP B WHO UNDERWENT PLYOMETRIC TRAINING PROGRAMME IN KABADDI PLAYERS.

	Mean	N	S.D	Std. error	Sig
Pre test	11.21	30	0.754	0.138	.000
Post test	10.977	30	0.745	0.136	

In this table p value is less than 0.05 which shows that there is a significant difference between Pre and Post Agility T-test in group B who underwent Plyometric training in Kabaddi players. P<0.05

Table 3: COMPARISON BETWEEN POST VALUES OF LADDER TRAINING VERSUS PLYOMETRIC TRAINING PROGRAMME ON AGILITY BETWEEN GROUP A AND GROUP B IN KABADDI PLAYERS.

	Mean	N	S.D	Std. error	Sig
GROUP A	10.377	30	0.449	0.082	0.000
GROUP B	10.977	30	0.745	0.136	

In this table p value is lesser than 0.05 which shows that there is significant difference in Agility between group A Ladder trained and group B Plyometric trained players. P<.05

RESULT

In table 1, the pretest values were compared with posttest values of Agility who underwent Ladder Drills in group A. According to this table p value is less than 0.05, which shows that there is a significant difference between pre and posttests who underwent Ladder Drills to improve Agility. As a result, posttest after Ladder training shows decreased time to perform Agility T test than pretest time to perform Agility T test.

In table 2, the pretest values were compared with posttest values of Agility who underwent Plyometric training in group B. According to this table p value is less than 0.05, which shows that there is a significant difference between pre and posttests who underwent Plyometric training to improve Agility. As a result, posttest after

Plyometric training shows decreased time to perform of Agility T test than pretest time to perform Agility T test.

In table 3, the posttest values of Agility T-test are compared between group A Ladder Drills and group B Plyometric training programme. According to this table p value is lesser than 0.05, which shows that there is significant difference in Agility T-test between group A Ladder Drills and group B Plyometric training programme in Kabaddi players which shows ladder drills have more effectiveness than Plyometric training in performing Agility T test

DISCUSSION

The purpose of the study was to know the Effect of Ladder training versus Plyometric training on Agility in Kabaddi players. The discussion of the present study was based on findings obtained from descriptive and inferential statistical analysis of collected data. It is presented in view of objectives of the study.

OBJECTIVE -1: To evaluate the effects of Ladder training versus Plyometric training programme on Agility through Agility T-test in Kabaddi players.

Among 60 students aged 18-25 years both genders equally grouped into two has shown improvement in performance of Agility T test after ladder and plyometric training programme.

Alexis Padrón-Cabo, Ezequiel Rey, Anton Kalén, Pablo B Costa 2020-07-21^[18]. A study conducted to examine the effects of coordination training using an agility ladder compared with a control group on physical fitness and technical performance in youth soccer players. Eighteen male youth soccer players (age: 12.2 ± 0.4 years; body height: 158.3 ± 10.8 cm; body mass: 45.0 ± 8.0 kg) were randomly assigned to an agility ladder group (n = 10) or a control group (n = 8). The intervention program was carried out three times a week over six weeks. Before and after the training period, the 10 m sprint, 20 m sprint, dribbling speed test, agility test, and slalom dribbling test performances were

assessed. Within-group analysis showed significant improvements ($p < 0.005$) in 10 m and 20 m sprint performance from the pre- to the post-test for the agility ladder group (-2.39% and -2.10%) and the control group (-2.54% and -1.44%). No significant differences ($p > 0.005$) were found from the pre- to the post-test in the dribbling speed test, agility test, slalom dribbling test, and skill index. In the between-group analysis, there were no differences between the agility ladder group and the control group in any variable. In conclusion, the findings of this study suggest coordination training with an agility ladder does not seem to be effective to improve physical fitness and dribbling.

Smurti Bhisaji Pawar and Dr. Pradeep Borkar. 2018^[24] A study to conducted the effect of ladder drills training on agility performance among female semiprofessional kabaddi players. To execute their training, 48 female semiprofessional kabaddi players were selected studying in school and colleges, according to inclusion and exclusion criteria. The age group was ranged from 12-20 years. Approval and written consent were taken from each player for the study. The players were further divided into two groups: control group and experimental group. In control group (n=24 players) where they did not participate in any activity and in experimental group (n=24 players) who underwent ladder drill training for 4 days/weeks,6 weeks. The outcome measure for both the groups was Agility T-test. The outcome measures of both the group were taken before and after training session. The result of the study, it was found that there was significant improvement on agility performance of the experimental group when compared to the control group. The experimental group, implementation of ladder drills training group achieved significant improvement in agility performance of female kabaddi players when compared to the control group.

Shallaby H. K. et. al. 2010^[37] A study to conducted the effectiveness of

Plyometric exercises on the special physical abilities and skillful performance of basketball players. It was applied to a sample of 20 players of 16 years old which were divided into two equivalent groups (experimental and control) of 10 players each. The experimental group applied the Plyometric exercises and the control group applied the usual program. The program was applied for 12 weeks with 3 training units at 120 minutes for each unit. The results pointed to a significant progress in the improvement percentages for the experimental group in all study tests compared to the improvement percentages of the control group, which led to an improvement in the skillful performance.

Milanović Z. et. al. 2013 [35] A study to conducted the effects of a 12-week conditioning programme involving speed, agility and quickness (SAQ) training and its effect on agility performance in young soccer players. Soccer players were randomly assigned to two groups: experimental group and control group. This suggests that SAQ training is an effective way of improving agility, with and without the ball, for young soccer players and can be included in physical conditioning programmers.

OBJECTIVE -2 To compare the effectiveness of Ladder training versus Plyometric training programme on Agility in Kabaddi players. It was statistically proved that Ladder training was more effective than Plyometric training programme in performing Agility T-test. Which show $p < 0.05$ level which results in rejection of null hypothesis and acceptance of alternate hypothesis.

Dr. S. Sethu 2014. The study compared the effects of the 8-week plyometric training and ladder training on speed, power and agility of collegiate football players. The pretest and posttest randomized control group design was used as an experimental design. Thirty-six male football players volunteered to participate, they were randomly assigned in to

Plyometric training group (PTG; $n = 12$), ladder training group (LTG; $n=12$) and control group (CG; $n=12$). Plyometric training and ladder training was undertaken thrice a week for 8 weeks. Participants were tested pre and post the 8-week training period. 35 mts sprinting speed test, sergeant jump test and Illinois agility run Test were measured pre and post training. Paired t-test, ANCOVA and Scheffe's test were used to evaluate the effect of training. In all the cases 0.05 level of confidence was fixed to test the hypothesis. The result of this study reveals that plyometrics and ladder training on speed, power and agility gives the similar improvement among football players and plyometrics and ladder training compared on speed, power and agility due to the effect of 8 week of training results, Plyometric training group was better improved on sprinting speed and vertical explosive power of football players, Ladder training group was better improved on agility performance of football players due to the effect of training. Both training can be used for improving speed, power; and agility in collegiate football players.

CONCLUSION

In this study post interventions performance level has increased when compared to pretest level of performance to perform Agility T – test due to Ladder drills and Plyometric training programme and also concludes that ladder training is more effective than plyometric training programme where $P < 0.05$.

Hence it can be recommended that Ladder training programme is more effective, useful and performance oriented rather than usual Plyometric and some other regular training programme.

LIMITATION

- Sample size was small.
- Study duration was short.

RECOMMENDATIONS

- Future studies can be done in larger sample size.

- Future studies can be done using other plyometric surfaces. E.g., Water, Grass.
- Future studies can be done on other players. i.e., Hurdlers, High jumper
- Future studies can target more on agility performance using plyometrics

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