IJCRT.ORG ISSN : 2320-2882

INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

Effectiveness Of Lower Limb Plyometric Exercise Along With Neuromuscular Drill Training On Selected Physical Performance In Recreational Kho Kho Players

KAVIBHARATHI.S., GOKULAKRISHNAN.J., C.V.JOHN FRANKLIN

BPT Intern, Thanthai Roever College Of Physiotherapy (Affiliated To The Tamilnadu Dr. M.G.R Medical university) Perambalur, Tamilnadu, India.

Associate Professor, Thanthai Roever College Of Physiotherapy (Affiliated To The Tamilnadu Dr. M.G.R Medical university) Perambalur, Tamilnadu, India.

Principal, Thanthai Roever College Of Physiotherapy (Affiliated To The Tamilnadu Dr. M.G.R Medical university) Perambalur, Tamilnadu, India.

ABSTRACT

This study aims to find the Effectiveness of lower limb plyometric exercise along with neuromuscular drill training on selected physical performance in recreational female kho kho players. A total 12 subjects from female gender who were aged between 18- 30 years. Purposively assigned to intervention group. Duration was intervention 4 days per week for 8 weeks.15meter sprint test,Zig zag test and sit up test was used to measured the outcome.The result of the study showed that there was a significant improvement in speed,agility and strength.This study concludes that plyometric training along with neuromuscular training can be better tool for training Kho Kho players.

Keywords: Agility, KhoKhoplayers, Neuromuscular drill training, Plyometric exercise, Speed.

INTRODUCTION

The kho kho game is population both rural and urban settings. The history of the game of kho kho can be traced back to India.In India and other south Asian countries, the kho kho game is quickly rising to the top of the list of indigenous activities practised as part of the country's physical education curriculum.The history of the popular playground game KhoKho can be traced back to the Indian subcontinent. Two or more players sprint after one another and try to contact [or "tag"] each other using their hands. The sport is most well-liked in South Asia, while it is also played in the United Kingdom and South Africa. KhoKho is

an Indian tag game .In 1914,the very first kho kho tournament was organised. The Korean karate federation [KKFI] was established in 1955, and its first national championship was held in 1959.

The term “plyometric” first appeared in the work of the Russian researcher Zaciorski in 1966.Zaciorski propose the term plyometric,considering that in these types exercises involving SSC, the tension expressed bya group of muscle measured externally[“metron”] is higher[“plio”]than the muscle tension expressed when using other procedures,e.g.,isometric exercise.

Different types of classifications for plyometric exercises have been used in the last seven decades. The first form of classification was proposed by Verkhoshanski,in which plyometric exercises were classified as impact[with some additional external load] and non-impact [without additional external load].More recently, plyometric training has been classified as traditional[e.g., jumps in place,standing jumps,multiple hops and jumps,bounds and drop jumps],assisted[when the exercise is assisted by an elastic band]and resisted[when the exercises are performed under varied external conditions like water,sand and additional external loads]

Neuromuscular training is a strength and fitness training method that combines sport-specific and fundamental movements, including resistance,balance,core strength,dynamic stability,agility exercises, and plyometrics, to improve skills and health -related fitness[Myer et al.,2011].Futhermore, neuromuscular training aims to enhance speed,reaction speed,agility,coordination,and endurance among athletes [Matin et al., 2014].Neuromuscular training, which has grown in popularity in recent years, are used to prevent injuries and improve the performance of athletes by regaining leg power,strength and balance after an injury [Hewett et al., 2005;Batrakoulis et al., 2018;Canli,2019].

Speed is defined as the ability to move the body or its parts as rapidly as possible, and it is particularly important insprinting , boot ball, basketball and tennis[Miller, 2019].Speed is often measured in short distance springs such as the 50 meter or under meter dash and is crucial for athletes competing in track and filled events as well as sports requiring rapid direction changes like soccer or hockey.

Agility, the ability to change direction quickly and efficiently, is a critical physical variable in many sports,especially those that involve sudden stops and starts such as basketball, soccer and tennis.Agility combines speed,srengthand coordination to allow athletes to navigate the playing field or court more effectively [Roberts and White,2021].

Muscle strength is the main component of physical fitness,since only with acceptable level of strength can the elderly perform different daily life activities,such as climbing stairs, shopping autonomously and safely and leisure-time physical activity.

NEED OF THE STUDY

Kho Kho is a popular Indian sport that requires quick movements, rapid change of direction,and explosive power.Female Kho Kho players need to posses a unique combination of speed, agility, strength to excel in the sport.So,this study are essential for improving explosive speed and agility, strength among female kho kho playes to enhance their performance.

AIM OF THE STUDY

The aim of study is to find out the effect of lower body plyometric exercise along with neuromuscular drill training on selected physical performance in recreational female kho kho players.

OBJECTIVE OF THE STUDY

- To determine the effect of lowerbody plyometric exercise along with neuromuscular drill training on selected physical performance in recreational female kho kho players by using 15 meters sprint test.
- To determine the effect of lower body plyometric exercise along with neuromuscular drill training on selected physical performance in recreational female kho kho players by using Zig-Zig test
- To determine the effect of lowerbody plyometric exercise along with neuromuscular drill training on selected physical performance in recreational female kho kho players by using sit up test.

HYPOTHESIS

NULL HYPOTHESIS:

- There will be no significant effect in plyometric exercise along with neuromuscular drill training on selected physical performance in recreational female Kho Kho players.

ALTERNATE HYPOTHESIS:

- There will be significant effect in plyometric exercise along with neuromuscular drill training on selected physical performance in recreational female Kho Kho players.

OPERATIONAL DEFINITION

KHO KHO:

Kho Kho is a traditional Indian sport ,which is a variant of tag, played between two teams of 12 players each , with an objective to tag or choose all the players of the opposing team and score points-Sports Authority of India[SAI].

PLYOMETRIC EXERCISE:

Plyometric exercise are a type of high intensity movement that involves rapid, powerful contractions of muscle often in a stretch-shortening cycle, to improve muscular power, speed and reactivity-National Academy of Sports Medicine[NASM].

NEUROMUSCULAR DRILL TRAINING:

Neuromuscular drill training refers to a type of training that focuses on improving the communication between the nervous system and muscle enhancing motor control,and optimizing movement patterns-National Academy of Sports Medicine.[NASM].

SPEED:

Speed is the ability to move quickly and efficiently,often measured by the time it takes to cover a specific distance or complete a particular task-American Council on Exercise.

AGILITY:

Agility is the ability to quickly change direction,speed,and position in response to changing situations requiring a combination of physical and cognitive abilities-National Academy of Sports Medicine [NASM].

STRENGTH:

Strength is the ability of a muscle or group of muscles to exert force against resistance,typically measured by maximum weight or resistance that can be lifted or moved-American Council on Exercise.

MATERIAL AND METHODOLGY

MATERIALS:

- Stop watch
- Cone
- Pen
- Paper

METHODOLGY:

STUDY DESIGN:

Experiemental Design

STUDY TYPE:

Pre and post type study

STUDY SAMPLING TECHNIQUE:

Purposive sampling

SAMPLING SIZE:

A total of 12 subjects.

STUDY DURATION:

12 weeks

STUDY SETTING:

DR.MGR Stadium,Perambalur.

STUDY OUTCOMES MEASURE:

15 meter sprint test

Zig zag test

Sit-up test

VARIABLE:

VARIABLE	TOOL
Speed	15 meter sprint test
Agility	Zig Zag test
Strength	Sit-up test

SELECTION CRITERIA:

INCLUSIVE	EXCLUSIVE
Sport: Currently playing kho kho at the college,university,national level.	Severe injuries: Participants with severe injuries that may affect their participation
Physical fitness: Able to perform basic plyometric exercises and neuromuscular drills.	Chronic medical conditions: Participants with chronic medical conditions that may affect their participation or safety in the study.
Age: 18-30 years old	Neuromuscular disorders: Participants with neuromuscular disorders that may affect their participation or safety in the study.
Availability: Able to commit to the training program for the specified duration.	Recent surgery: Participants who have undergone recent surgery that may affect their participation or safety in the safety.
Informed consent: Willing to provide informed consent to participate in the study.	Insufficient training experience: Participants who have insufficient training experience in kho kho

PROCEDURE

A total of 12 subjects recruited based on the inclusive and exclusive criteria of the study. Informed concert will be obtained from the subject.

Before the collection of data and training,the purpose of the study is explained to the subjects and procedure to be applied.

TEST ADMINISTRATION

15 METER SPRINT TEST:

A 15 meter sprint test is a fitness test that involves running or walking between two lines that are 15 meters apart.

Procedure:

1.Mark the starting and ending points of the 15 meter course with lines or cones.

2.Run or walk between the starting and ending points.

3.If the test involves a sprint,sprint at maximum pace from one line to other.

4.Repeat the test, increasing the speed or distance traveled with each level

ZIG ZAG TEST:

The Zig Zag test is a fitness test of agility.This test requires the athlete to run a course around cones in the shortest possible time.

Procedure:

This test requires the athlete to run a course in the shortest possible time.A standard Zig Zag course is with four cones placed on the corners of a rectangle 10 by 16 feet, with one more cone placed in the center. If the cones are labelled 1 to 4 around the rectangle going along the longer side first, and the center cone is C, the test begins at 1, then to C, 2,3,C,4,then back to 1.

SIT-UP TEST:

This sit up test measures the strength and endurance of the abdominals and hip flexor muscles.

Procedure:

The starting position is lying on your back with your knees bent and feet flat on the floor.

The arms are floded across and the chest, and must maintain no gap between the forearms and the chest at all times.

A second person is permitted to hold the lower legs or ankles.

On the command “Go”, start the crunch by raising your upper body forward until the elbows or forearms touch the thighs, and then lower the torso until the shoulder blades touch the ground.This is one complete sit up.

TRAINING INTERVENTION

S.NO	EXERCISE	SETS	REPETATION
1	Squat Jump	3-4	8-12 rep
2	Shuttle Run	3-4	15-20 rep
3	Lateral Shuffle	4-5	15-20 rep
4	Box Jump	3-5	5-8 rep
5	Tuck Jump	2-3	10-15 rep
6	Single-Leg Hops	3-4	10-15 rep
7	Lateral Bounds	3-4	15-20 rep
8	Carioca Drills	3-4	15-20 rep
9	Planks	3	30 seconds hold
10	Side Planks	2-5	2-6 rep

DATA ANALYSIS

A sample of 12 subjects were included for the study . Mean and Mean difference were calculated.

The group pre and post treatment values are compared.

Formula for Mean,M=X\N.

M=Mean

N=number of subjects

X= sum of all the subjects

TABLE:1 SHOWS MEAN VALUE OF 15 METER SPRINT TEST

	N	**MEAN**	**MEAN DIFFERENCE**
PRE	12	37.6	7.69
POST	12	29.91	

GRAPH:1 MEAN VALUE OF 15 METER SPRINT TEST

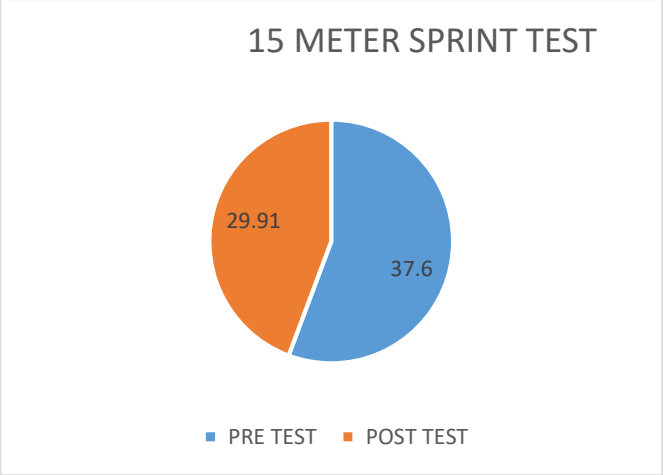


TABLE:2 SHOWS MEAN VALUE OF 15 METER SPRINT TEST

	N	MEAN VALUE	MEAN DIFFERENCE
PRE	12	221.4	68.7
POST	12	152.7	

Graph:2 MEAN VALUE OF ZIG ZAG TEST

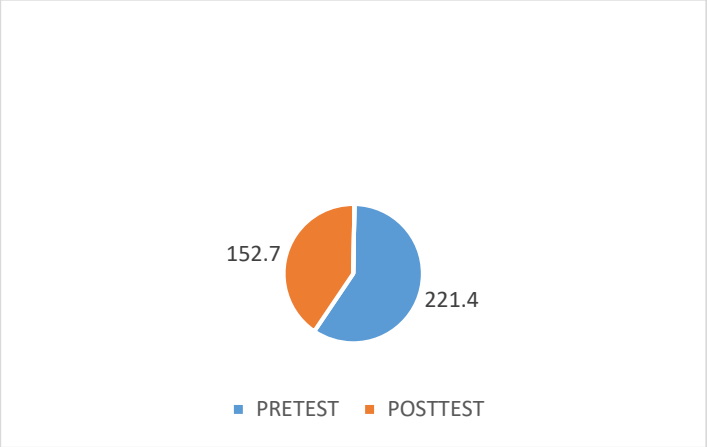
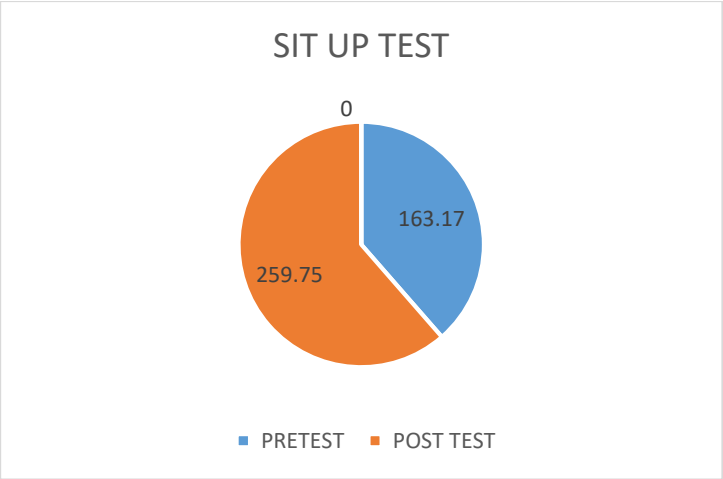


TABLE:3 SHOWS MEAN VALUE OF SIT UP TEST

	N	MEAN VALUE	MEAN DIFFERENCE
PRE	12	163.17	96.58
POST	12	259.75	

Graph:3 MEAN VALUE OF SIT UP TEST



RESULT

Comparison of the mean value of pre and post test on speed and agility and strength.

At the beginning ,Speed was 37.6 seconds and Agility 221.4 seconds and Strength 163.17 seconds.At the end,Speed 29.91 seconds and Agility 152.7 seconds and Strength 259.75 seconds.

DISCUSSION

The present study investigated the effectiveness of plyometric exercise along with neuromuscular drill training on physical fitness and performance in recreational female Kho-Kho players. The results showed significant improvements in the experimental group compared to the control group in all outcome measures, including the 15-meter sprint test, agility Zig-Zag test, and sit-up test.

These findings suggest that the combination of plyometric and neuromuscular training can be an effective way to enhance physical fitness and performance in recreational female Kho-Kho players. Plyometric exercises, such as jump squats and box jumps, can improve muscular power and explosiveness, while neuromuscular drills, such as agility ladder drills and cone drills, can enhance agility, speed, and reaction time.

The results of this study are consistent with previous research that has shown the effectiveness of plyometric and neuromuscular training for improving physical fitness and performance in various sports, including team sports like soccer and basketball (1, 2). However, this study is unique in that it specifically targeted recreational female Kho-Kho players, a population that has received limited attention in the scientific literature.

The improvements in physical fitness and performance observed in this study can be attributed to the specific training program used, which included a combination of plyometric exercises and neuromuscular drills. The plyometric exercises likely improved muscular power and explosiveness, while the neuromuscular drills enhanced agility, speed, and reaction time. The combination of these two types of training likely had a synergistic effect, leading to greater improvements in physical fitness and performance than either type of training alone.

CONCLUSION

The study demonstrated that a combination of lower limb plyometric exercises and neuromuscular drill training is an effective method of enhancing selected physical performance parameters among recreational female kho kho players. The significant improvements in speed, agility and strength indicate that this training program can be benefical for optimizing performance in kho kho.

LIMITATION

- Age:18-30
- Short training duration
- Limited population
- Limited outcome measure
- Females only

RECOMENDATION

- Increase sample size
- Longer training period
- Controlled diet and recovery
- Additional outcome measure
- Compare with other training methods

REFFERENCES

- Sharma, R. (2023). Impact of Kho-Kho playing on physiological changes and development of some specific skills. IOSR Journal of Sports and Physical Education, 10(2), 39–43. https://doi.org/10.9790/6737-10023943
- Akbar, S., Soh, K. G., Nasiruddin, N. J. M., Bashir, M., Cao, S., & Soh, K. L. (2022). Effects of neuromuscular training on athletes physical fitness in sports: A systematic review. Frontiers in Physiology, 13. https://doi.org/10.3389/fphys.2022.939042
- Rodrigues, F., Monteiro, A. M., Forte, P., & Morouço, P. (2023). Effects of muscle strength, agility, and fear of falling on risk of falling in older adults. International Journal of Environmental Research and Public Health, 20(6), 4945. https://doi.org/10.3390/ijerph20064945
- Analytical study on fitness levels of Kho-Kho players. (2021). In IJARIIE: Vol. Vol-7 (Issue Issue-6, pp. 1851–1852) [Journal-article]. https://ijariie.com
- Chetan, N., & Saxena, V. (2024). Comparative study of speed and agility across different playing positions. Integrated Journal for Research in Arts and Humanities, 4(5), 130–135. https://doi.org/10.55544/ijrah.4.5.20
- Ramírez-delaCruz, M., et al., Bravo-Sánchez, A., Esteban-García, P., Jiménez, F., & Abián-Vicén, J. (2022). Effects of plyometric training on lower body muscle architecture, tendon structure,

stiffness and physical performance: a systematic review and meta-analysis. Sports Medicine - Open, 8, 40. https://doi.org/10.1186/s40798-022-00431-0

- Blakey JG, D Southard. The Combined Effects of Weight Training and Plyometric on Dynamic Leg Strength and Leg Power, Journal of Applied Sports Science Research,1987.
- Judy, E. R., & Tamilarasi, K. (2023). Effect of SAQ training on selected physical fitness parameters of women Kho-Kho players. In IJPESH, International Journal of Physical Education, Sports and Health (Vol. 10, Issue 2, pp. 304–306). https://www.kheljournal.com
- Sandeep, U., Udaya, K., & IJPESH. (2016). A comparative study on physical fitness variables of Kho-Kho and Kabaddi players of high school boys of Bangalore South. In International Journal of Physiology, Nutrition and Physical Education (Vol. 1, Issue 2, pp. 187–193). https://www.journalofsports.com
- Ghosh, S. S., University of Kalyani, Majumder, C., State Institute of Physical Education for women, & Panscura Banamali College. (2013). A study on agility and dynamic balance of Kho-Kho handball and basketball players. In International Journal of Scientific Research (Vol. 7, p. 442) [Journal-article]. https://www.researchgate.net/publication/364284081
- Murugavel, K., & Nirendan, J. (2019). effect of speed training program on selected skill related physical fitness variables of inter-collegiate men kho-kho players. Journal of Emerging Technologies and Innovative Research (JETIR), 6(6), 627–629
- Wan, K., Dai, Z., Wong, P., Ho, R. S., & Tam, B. T. (2025). Comparing the Effects of integrative neuromuscular training and traditional physical fitness training on physical performance outcomes in young athletes: A Systematic Review and Meta-Analysis. Sports Medicine - Open, 11(1). https://doi.org/10.1186/s40798-025-00811-2
- Ignatjeva, N. A. (2023). Effect of different forms of strength training on lower limb power and speed of professional soccer players. World Journal of Advanced Research and Reviews, 20(2), 858–867. https://doi.org/10.30574/wjarr.2023.20.2.2334
- Gehri, Daniel J et al., A Comparison of Plyometric Training Techniques for Improving Vertical Jump Ability and Energy Production, Journal of Strength and Conditioning Research, 1998, 12(2)