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## Combined Ladder With Plyometric Training On Selected Physiological And Skill Performance Variables Of School Level Kho Kho Players

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### Abstract

Ladder drills are instrumental in improving foot speed, agility, coordination, and overall quickness, which are crucial for the rapid directional changes inherent in Kho-Kho. Plyometric exercises, characterized by explosive movements, augment muscular power and speed-strength, enabling players to execute swift offensive and defensive maneuvers. In order to assess the real facts the investigator made an attempt to examine the impact of combined ladder and plyometric training on physiological and skill performance variables of twenty Kho-Kho players were selected from Coimbatore district in Tamil Nadu state. They were age ranged between 14 to 17 years. Treatment group I underwent combined ladder with plyometric, group II acted as control group. All forty subjects were inducted for pre and posttest on physiological and skill performance variables are (vital capacity and cover of attack). The ladder with plyometric training programme was given to the experimental group for 3 days per week (Monday, Wednesday and Friday) for the period of eight weeks. The control group was not given any sort of training except their routine work. The physiological variables vital capacity (wet spirometer test) cover of attack was assessed by Khelo India Fitness Test were assessed before and after training period. The result from 't' test and inferred that 8 weeks ladder with plyometric training treatment produced identical changes over physiological and skill performance variables of kho kho players. Further, the findings confirmed the ladder with plyometric training is suitable protocol to bring out the desirable changes over vital capacity and cover of attack variables of kho kho players.

**Key words:** Ladder, Plyometric Training, Physiological Variables, Skill Performance Variables, Vital Capacity, Cover of Attack and Kho Kho Players.

## **INTRODUCTION**

Ladder training is a high-intensity, movement-based exercise method that enhances multiple physiological variables through functional movements. It improves cardiorespiratory endurance by engaging the heart and lungs during continuous footwork patterns, contributing to better oxygen delivery and aerobic capacity. Functional movements in ladder drills such as forward sprints, lateral steps, and diagonal runs increase muscular strength and endurance, especially in the lower limbs, by repeatedly activating muscle groups like the quadriceps, hamstrings, calves, and gluteus. These drills also develop neuromuscular coordination, leading to improved synchronization between the nervous system and muscular actions. Ladder training enhances flexibility and joint mobility, as the body is required to move quickly through varied ranges of motion, which helps prevent injuries. Through systematic drills focusing on speed, agility, balance, coordination, and reaction time, ladder training leads to measurable improvements in athletic performance. These variables are essential for executing complex sport-specific skills with precision and efficiency. Regular engagement in ladder drills sharpens foot speed and directional changes, enabling athletes to perform faster transitions and better positioning during gameplay. **Bhati et al., (2023).**

Incorporating plyometric training into Kho Kho routines results in improved energy efficiency, better muscle recovery, and reduced injury risks. It allows athletes to maintain performance over longer durations with explosive energy bursts and minimal fatigue. Moreover, it prepares players mentally and physically for high-stress competitive conditions while promoting long-term strength, athleticism, and functional movement efficiency. Plyometric exercises can be easily scaled for age, skill level, and training goals, making them suitable for beginners and elite Kho Kho athletes alike. **Sharma et al., (2024).**

Functional movements used in plyometric training also improve joint stability, core engagement, and postural control, reducing the risk of injury. Over time, consistent plyometric exercise enhances bone density, muscle elasticity, and metabolic function, supporting better anaerobic capacity and energy output. These adaptations result in faster sprinting, more powerful jumping, and efficient deceleration—all crucial in many sports. In summary, plyometric training creates a strong physiological foundation by combining high-impact, functional movements with targeted muscular and nervous system activation, ultimately leading to improved strength, agility, endurance, and athletic efficiency. **Sharma et al., (2024).**

## 2. MATERIALS AND METHODS

### 2.1 Participants

In order to address the hypothesis presented herein, we selected 40 kho kho players from various schools in Coimbatore District. Their age ranged from 14 to 17 years. The subjects were randomly assigned in to two equal groups namely, ladder with plyometric training group (LWPTG) (n=20) and Control group (CG) (n=20). The respective training was given to the experimental group the 3 days per weeks (alternate days) for the training period of eight weeks. The control group was not given any sort of training except their routine.

### 2.2 Research Design

The evaluated physiological and skill performance parameters were vital capacity were assessed by wet spirometer test in liters and cover of attack were assessed by Khelo India Fitness Test unit of measurement in points. The parameters were measured at baseline and after 8 weeks of ladder with plyometric training group were examined. The intensity was increased once in two weeks based on the variation of the exercises.

### 2.3 Training Protocol

The training programme was lasted for 90 minutes for session in a day, 3 days in a week for a period of 8 weeks duration. These 90 minutes included warm up for 10 minutes, and 10 minutes warm down remaining 70 minutes allotted for training programme. The equivalent in ladder with plyometric training group is the length of the time each action in total 3 day per weeks (Monday, Wednesday and Friday).

### 2.4 Statistical Analysis

The collected data on physiological and skill performance variables due to the effect of ladder with plyometric training group was statically analyzed with “t” test to find out the significant improvement between pre& posttest if any. In all case the criterion for spastically significance was set at 0.05level of confidence ( $P < 0.05$ )

## 3. Results

All subjects completed the study according to the aforementioned methodology. The 15 training subjects averaged 96% attendance and no injuries occurred from the training program. There were no significant differences in height or weight between groups either before or after the training and detraining periods.

TABLE - I

**COMPUTATION OF 'T' RATIO ON VITAL CAPACITY OF KH KHO PLAYERS ON  
EXPERIMENTAL GROUP AND CONTROL GROUP**

(Scores in liters)

| Group          | Test               |           | Mean | Std. Deviation | T ratio |
|----------------|--------------------|-----------|------|----------------|---------|
| Vital Capacity | Experimental Group | Pre test  | 3.36 | 0.12           | 5.28*   |
|                |                    | Post test | 3.51 | 0.12           |         |
|                | Control Group      | Pre test  | 3.37 | 0.11           | 0.49    |
|                |                    | Post test | 3.37 | 0.15           |         |

\*significant level 0.05 level (degree of freedom 2.09, 1 and 19)

Table I reveals the computation of mean, standard deviation and 't' ratio on vital capacity of experimental and control group. The obtained 't' ratio on vital capacity were 5.28 and 0.49 respectively. The required table value was 2.09 for the degrees of freedom 1 and 19 at the 0.05 level of significance. Since the experimental group 't' values were greater than the table value of 2.09, it was found to be statistically significant. The control group 't' value is less than table value of 2.09 it was found to be statistically insignificant.

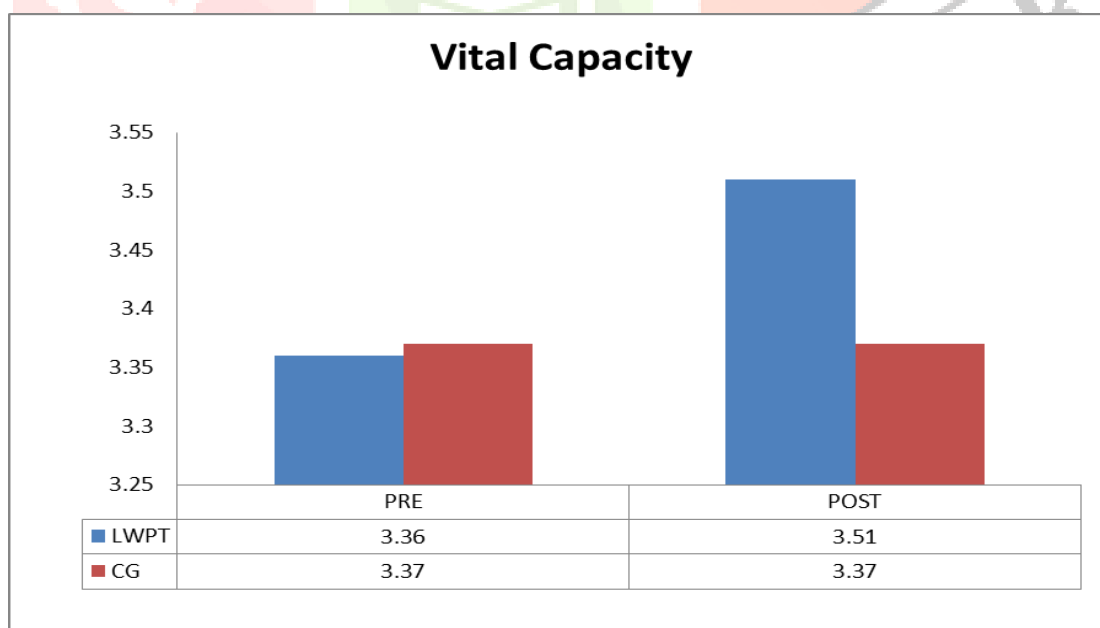


FIGURE- I

**BAR DIAGRAM SHOWING THE MEAN VALUE ON VITAL CAPACITY OF KHO KHO PLAYERS ON  
EXPERIMENTAL GROUP AND CONTROL GROUP**

TABLE - II

**COMPUTATION OF 'T' RATIO ON COVER OF ATTACK OF KHO KHO PLAYERS ON  
EXPERIMENTAL GROUP AND CONTROL GROUP**

(Scores in Points)

| Group           | Test               |           | Mean  | Std. Deviation | T ratio |
|-----------------|--------------------|-----------|-------|----------------|---------|
| Cover of Attack | Experimental Group | Pre test  | 28.85 | 4.72           | 5.59*   |
|                 |                    | Post test | 25.90 | 4.61           |         |
|                 | Control Group      | Pre test  | 28.10 | 2.91           | 1.33    |
|                 |                    | Post test | 28.45 | 2.62           |         |

\*significant level 0.05 level (degree of freedom 2.09, 1 and 19)

Table III reveals the computation of mean, standard deviation and 't' ratio on cover of attack of experimental and control group. The obtained 't' ratio on cover of attack were 5.59 and 1.33 respectively. The required table value was 2.09 for the degrees of freedom 1 and 19 at the 0.05 level of significance. Since the experimental group 't' values were greater than the table value of 2.09, it was found to be statistically significant. The control group 't' value is less than table value of 2.09 it was found to be statistically insignificant.

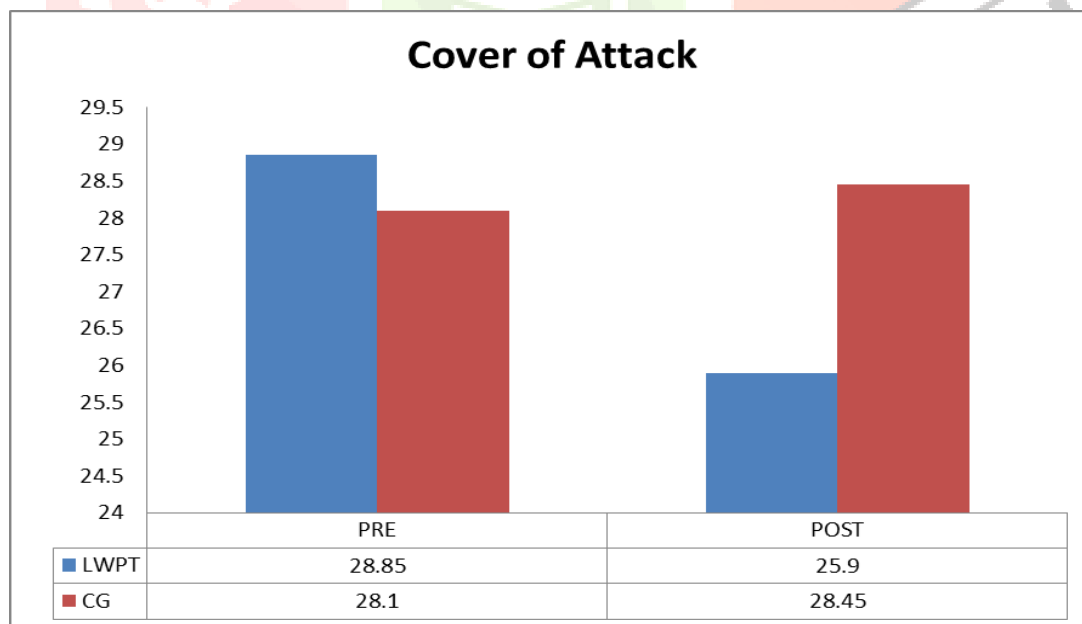


FIGURE- II

**BAR DIAGRAM SHOWING THE MEAN VALUE ON COVER OF ATTACK OF KHO KHO PLAYERS  
ON EXPERIMENTAL GROUP AND CONTROL GROUP**

#### 4. DISCUSSION

The present study experimented the effect of ladder with plyometric training on selected physiological and skill performance variables of kho kho players. The findings of the present study had similarity with the findings of the investigations referred in this study. However, there was a significantly changes of subjects in the present study the physiological and skill performance was significantly improved of subject in the group may be due to the in ladder with plyometric training.

The improvements can be attributed to the nature of ladder drills, which enhance neuromuscular coordination, foot speed, and body balance, while plyometric exercises strengthen the stretch shortening cycle of muscles, thereby increasing explosive power and agility. Similar results have been reported by **Miller et al. (2006)**, who emphasized that agility ladder training contributes to enhanced coordination and quickness in young athletes. Moreover, studies by **Markovic and Mikulic (2010)** confirmed that plyometric training is highly effective in developing lower-body power and speed, which are crucial for chasing and dodging actions in Kho-Kho. The present findings are also in line with **Chaouachi et al. (2017)**, who highlighted that combining coordination-based drills with plyometric exercises produces superior adaptations compared to isolated training methods. Hence, the combined approach not only improved physiological efficiency but also enhanced game-specific skills, indicating its suitability for systematic training programs in school-level Kho-Kho players.

#### 5. Conclusions

Based on the results and discussion of the study, the following conclusions were drawn:

It can be concluded that the implementation of ladder training combined with plyometric exercises brought about significant improvements in both physiological and skill performance variables of school-level Kho-Kho players.

These findings highlight that players with better adaptability to ladder and plyometric training tend to perform more effectively during crucial phases of the game, thereby contributing to overall athletic development. The outcomes of this study provide a scientific basis for incorporating structured ladder and plyometric drills into Kho-Kho training regimens, ensuring improved physiological efficiency and refined skill execution for enhanced competitive performance.

## REFERENCES

1. Sharma, K. R., Bhart, R., Prakash, D., Kumar, S., & Kumar, A. (2024). Effects of Combination of Unilateral and Plyometric Exercise in Comparison to Bilateral Exercise on Performance-Related Components of Male Kho-Kho Players. *Frontiers in Health Informatics*, 13(3).
2. Karuppaiyan, R. K., Jebaslin Durai, D., CHANDRA SHEKHAR, S. P., & Chinnusamy, S. (2025). Effectiveness Of Plyometric Training Versus Ladder Training Along With Manual Therapy On Power And Agility Among Gymnastic Subjects With Post Achilles Tendon Rupture-A Comparative Study. *Cuestiones de Fisioterapia*, 54(4).
3. Padder, M. W. J., & Ramesh, G. Impact Of Ladder Training And Plyometric Training On Agility And Explosive Power Among School Level Kho-Kho Players. *Turkish Journal of Physiotherapy and Rehabilitation*, 32, 3.
4. Kumar, A., & Sivasankar, S. (2018). Effect of traditional training with and without ladder training on motor fitness variables of high school kho-kho players. *Asian Journal of Multidimensional Research (AJMR)*, 7(2), 699-709.
5. Durai, M. P. T., & Sivakumar, S. P. C. S. D. effectiveness of plyometric training versus ladder training along with manual therapy on power and agility among gymnastic subjects with post achilles tendon rupture-a comparative study.
6. Jeyasharmila, m. S., kumaran, d. R. S., & saroja, d. S. (2025). Effect of saq and ladder training on selectedphysiologicalvariablesamong college men handball players. *TPM–Testing, Psychometrics, Methodology in Applied Psychology*, 32(S4 (2025): Posted 17 July), 502-508.
7. Rani, U. (2025). Speed Enhancement Through Combined Plyometric and Skill Training: An 8-Week Study on Beginner Fencers. *Sports Science & Health Advances*, 3(1), 487-492.
8. Reddy, P. V., & Murali, R. (2021). Application Of Plyometric Training On The Development Of Physical Fitness Among University Athletes In Mahatma Gandhi University, Nalgonda. Lulu Publication.