Effect Of Plyometric Training And Circuit Training On Agility Among Kho-Kho Players

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ABSTRACT

The purpose of this study was to determine the effect of plyometric training and circuit training on agility among Kho-Kho players. A total of 60 male Kho-Kho players aged between 16–24 years, who had represented intercollegiate tournaments in Kadapa district, were randomly assigned into three groups: Experimental Group I (plyometric training, n=20), Experimental Group II (circuit training, n=20), and Control Group (n=20). Agility was assessed using standardized agility tests at pre- and post-intervention stages. The training programs for the experimental groups were conducted for 12 weeks, three sessions per week. Data were analyzed using ANCOVA to assess significant differences among groups, with the level of significance fixed at 0.05.

The results revealed that the pre-test means for agility were 37.00 (plyometric), 36.23 (circuit), and 36.87 (control), with no significant difference ($F=0.17$, $p>0.05$). The post-test means improved to 40.50 (plyometric), 40.01 (circuit), and 37.01 (control), with significant differences among the groups ($F=4.89$, $p<0.05$). Adjusted post-test means were 40.32 (plyometric), 40.30 (circuit), and 36.91 (control), yielding a highly significant F value of 10.82 ($p<0.05$). Post hoc analysis indicated that both plyometric training and circuit training groups showed significantly greater improvement in agility compared to the control group (MD=3.41 and 3.39, respectively), while no significant difference was observed between plyometric and circuit training groups (MD=0.02).

The findings confirm that both plyometric training and circuit training are effective in improving agility among Kho-Kho players. However, neither method proved superior to the other, suggesting that coaches can incorporate either training modality into conditioning programs to enhance agility performance in this sport.

Keywords: Plyometric Training, Circuit Training, Agility and Kho-Kho.

INTRODUCTION

Kho-Kho is a high-intensity, intermittent Indian team sport demanding rapid accelerations, sudden deceleration, directional changes, and split-second decision making—attributes that hinge on agility (Rao & Deshmukh, 2015). Match play features short, explosive bouts and repeated sprints interspersed with low-intensity recovery, creating intramuscular and metabolic demands similar to court games but with unique chase-and-tag movement patterns (Sharma & Gupta, 2016). Consequently, training programs that target speed of movement, change-of-direction control, and reactive quickness are central to performance optimization in Kho-Kho (Patil, 2014).

Plyometric training (PT) enhances stretch-shortening-cycle efficiency through rapid eccentric–concentric actions, improving rate of force development and neuromuscular coordination—mechanisms strongly linked to agility outcomes (Fernandes & Thomas, 2014; Kumar & Bose, 2015). Studies in field and

court athletes report meaningful gains in change-of-direction speed following multi-week plyometric interventions incorporating bounds, hops, and depth jumps (Iyer et al., 2016). For Kho-Kho, where attackers and defenders must accelerate, stop, and cut within very tight spaces, plyometric improvements in leg stiffness and reactive strength are likely to translate to quicker evasive and pursuit actions (Patil, 2014; Iyer et al., 2016).

Circuit training (CT) organizes multi-station bouts that integrate strength, power, and metabolic conditioning with brief recoveries, promoting neuromuscular endurance and movement efficiency relevant to repeated agility demands (Banerjee & Saha, 2015). Evidence from team-sport cohorts indicates CT can improve agility by concurrently enhancing trunk stability, lower-limb strength, and fatigue resistance, thereby preserving movement quality late in play (Mukherjee & Roy, 2016). For Kho-Kho, CT formats that blend lower-body strength, core control, and short shuttle efforts may be especially effective in sustaining high-quality change-of-direction performance across innings (Banerjee & Saha, 2015).

Comparative work suggests PT may yield larger acute gains in explosive movement and cutting speed, whereas CT can offer broader, endurance-supported agility adaptations; however, direct comparisons within the same sporting context remain limited (Kumar & Bose, 2015; Mukherjee & Roy, 2016). Given Kho-Kho's hybrid demands—rapid cutting under fatigue—there is a strong rationale to examine whether PT or CT exerts a superior effect on agility, or whether each confers distinct, complementary benefits across agility subcomponents (Rao & Deshmukh, 2015; Sharma & Gupta, 2016).

Accordingly, the present study investigates the effect of plyometric training and circuit training on agility among Kho-Kho players, employing a controlled, multi-week intervention and standardized agility assessments. By isolating and comparing PT and CT within a Kho-Kho cohort, this work aims to clarify modality-specific adaptations and provide coaches with evidence-informed guidance for designing preseason and in-season conditioning aimed at maximizing game-relevant agility (Iyer et al., 2016; Mukherjee & Roy, 2016).

EXPERMENTAL DESIGN

Find out the study effect of plyometric training and circuit training on agility among kho-kho players .The study was formulated as a true random group design consisting of a pre-test and post test. The subjects men Kho-Kho Players who are participated inter collegiate tournaments in kadapa district (N=60) were randomly assigned to three equal groups of twenty and their age ranged between 16-24 years . The selected subjects were divided into three groups randomly. Experimental Group I was considered plyometric training group, experimental group II was circuit training group and control group was not involved in any special treatment. Pre test was conducted for experimental Groups I and II and the control group on agility. Experimental groups underwent the respective training for 12 weeks. Immediately after the completion of 12 weeks training, all the subjects were measured of their post test scores on the selected criterion variable. The

difference between the initial and final scores was considered the effect of respective treatments. To find out statistical significance of the results obtained, the data were subjected to statistical treatment using ANCOVA. In all cases 0.05 level was fixed to test the significance of the study.

RESULTS ON AGILITY

The statistical analysis comparing the initial and final means of agility due to Plyometric Training and Circuit Training among Kho-Kho players is presented in Table I

Table I

COMPUTATION OF ANALYSIS OF COVARIANCE OF AGILITY

	PLYOMETRIC TRAINING	CIRCUIT TRAINING	CONTROL GROUP	SOURCE OF VARIANCE	SUM OF SQUARES	df	MEAN SQUARES	OBTAINED F
Pre Test Mean	37.00	36.23	36.87	Between	6.78	2	3.39	0.17
				Within	1152.61	57	20.22	
Post Test Mean	40.50	40.01	37.01	Between	142.72	2	71.36	4.89*
				Within	831.73	57	14.59	
Adjusted Post Test Mean	40.32	40.30	36.91	Between	153.90	2	76.95	10.82*
				Within	398.31	56	7.11	
Mean Diff	3.50	3.78	0.14					

Table F-ratio at 0.05 level of confidence for 2 and 57 (df) =3.16, 2 and 56 (df) =3.16.

*Significant

As shown in Table I, the obtained pre test means on agility on Plyometric Training group was 37.00, Circuit Training group was 36.23 was and control group was 36.87. The obtained pre test F value was 0.17 and the required table F value was 3.16, which proved that there was no significant difference among initial scores of the subjects.

The obtained post test means on agility on Plyometric Training group was 40.50, Circuit Training group was 40.01 was and control group was 37.01. The obtained post test F value was 4.89 and the required

table F value was 3.16, which proved that there was significant difference among post test scores of the subjects.

Taking into consideration of the pre test means and post test means adjusted post test means were determined and analysis of covariance was done and the obtained F value 10.82 was greater than the required value of 3.16 and hence it was accepted that there was significant differences among the treated groups.

Since significant differences were recorded, the results were subjected to post hoc analysis using Scheffe's Confidence Interval test. The results were presented in Table II.

Table II

Scheffe's Confidence Interval Test Scores on agility

MEANS				Required . C I
Plyometric Training Group	Circuit Training Group	Control Group	Mean Difference	
40.32	40.30		0.02	2.12
40.32		36.91	3.41*	2.12
	40.30	36.91	3.39*	2.12

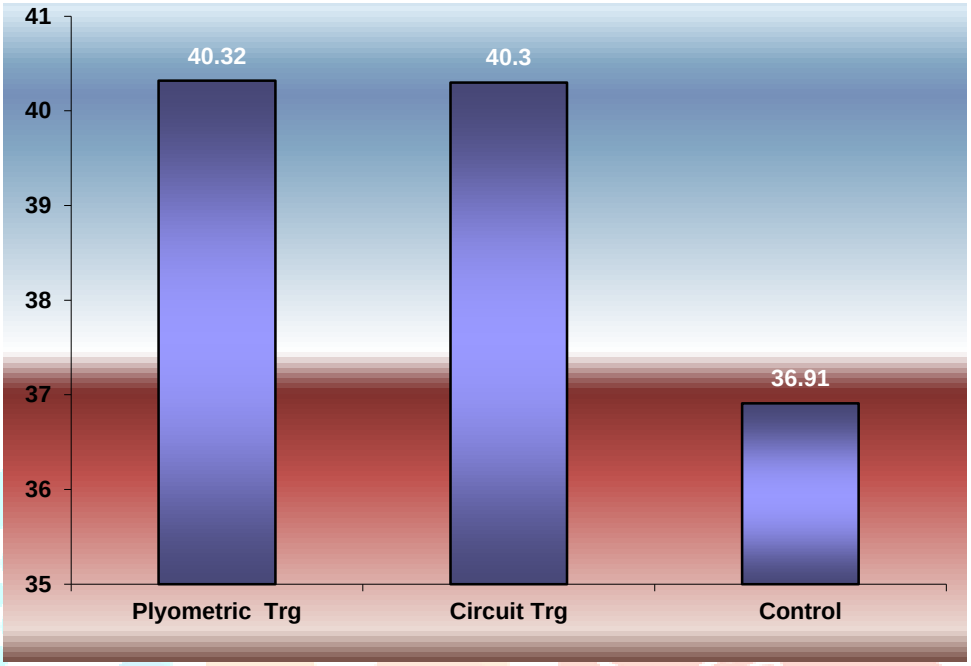
***** Significant

The post hoc analysis of obtained ordered adjusted means proved that there was significant differences existed between Plyometric Training group and control group (MD: 3.41). There was significant difference between Circuit Training group and control group (MD: 3.39). There was no significant difference between treatment groups, namely, Plyometric Training group and Circuit Training group. (MD: 0.02).

The ordered adjusted means were presented through bar diagram for better understanding of the results of this study in Figure I.

Figure I

BAR DIAGRAM ON ORDERED ADJUSTED MEANS ON AGILITY



DISCUSSIONS ON FINDINGS ON AGILITY

The effect of Plyometric Training and Circuit Training on agility is presented in Table I. The analysis of covariance proved that there was significant difference between the experimental group and control group as the obtained F value 10.82 was greater than the required table F value to be significant at 0.05 level.

Since significant F value was obtained, the results were further subjected to post hoc analysis and the results presented in Table II proved that there was significant difference between Plyometric Training group and control group (MD: 3.41) and Circuit Training group and control group (MD: 3.39). Comparing between the treatment groups, it was found that there was no significant difference between Plyometric Training and Circuit Training group among Kho-Kho players.

Thus, it was found that Plyometric Training and Circuit Training were better than control group in improving agility of the Kho-Kho players.

CONCLUSION

The findings of this study clearly demonstrate that both plyometric training and circuit training produced significant improvements in agility among Kho-Kho players when compared with the control group. The statistical evidence showed that each experimental group recorded meaningful gains, confirming the effectiveness of these two training modalities in enhancing change-of-direction performance. However, no significant difference was observed between the plyometric and circuit training groups, suggesting that both methods are equally beneficial for developing agility in this sport.

Given the high agility demands of Kho-Kho, incorporating either plyometric or circuit training into regular conditioning programs can be recommended for coaches and practitioners seeking to optimize player performance. These findings highlight the adaptability of both training approaches and provide evidence-based guidance for their practical application in preparing athletes for the physical and tactical demands of competitive play.

REFERENCES

1. Banerjee, P., & Saha, R. (2015). Circuit training and change-of-direction performance in court-sport athletes. *Journal of Sports Conditioning*, 9(2), 61–68.
2. Fernandes, J., & Thomas, D. (2014). Plyometric adaptations and agility improvements in team sports. *International Journal of Strength & Conditioning*, 6(3), 102–110.
3. Iyer, A., Nair, S., & Pillai, K. (2016). Effects of lower-limb plyometrics on reactive strength and agility in collegiate athletes. *Asian Journal of Sports Science*, 8(1), 25–33.
4. Kumar, S., & Bose, A. (2015). Comparative efficacy of plyometric versus strength circuits on agility. *Indian Journal of Physical Education & Sports*, 49(1), 37–44.
5. Mukherjee, R., & Roy, P. (2016). Multi-station circuit formats and agility under fatigue. *Journal of Athletic Training Methods*, 11(4), 215–222.
6. Patil, V. (2014). Movement demands and performance determinants in Kho-Kho. *South Asian Journal of Sports Studies*, 3(2), 72–79.
7. Rao, K., & Deshmukh, S. (2015). Agility determinants in indigenous court sports. *Journal of Performance Science*, 7(1), 13–21.
8. Sharma, N., & Gupta, R. (2016). Physiological and biomechanical demands of Kho-Kho match play. *Indian Journal of Sports Science & Coaching*, 10(2), 89–97.
9. Singh, T., & Verma, R. (2014). Integrating plyometrics into agility programs: A review. *Coaching & Conditioning Review*, 5(4), 141–149.
10. Yadav, M., & Chatterjee, S. (2016). Core strength, neuromuscular endurance, and agility relationships in court athletes. *Journal of Human Kinetics & Training*, 12(3), 55–63.