

A Study of the Impact of Strength Training on Defensive Skill (Thigh Hold) in Kabaddi Game

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Abstract: *The thigh hold is the game-changer in modern kabaddi defensive techniques. Mazumdar conducted the only relevant study regarding this technique. However, it is not empirically tested how strength training can enhance this powerful defensive technique. Strength and conditioning coaches believe that lower body and core strength are necessary physical requirements for executing a thigh hold. This study aimed to (1) improve the thigh hold skill of kabaddi players through a structured strength training program, (2) compare the worse thigh hold performance of an experimental group on strength training with a control group with no strength training but regular practice, and (3) see the net change in lower body strength after 12 weeks of training. Method: 30 male university-level kabaddi players (age 18-25 years; Rajasthan University) were randomly assigned to an Experimental Group (n = 15; 6-week strength training + regular practice) or Control Group (n = 15; regular practice only). The protocol was conducted over 6 weeks, with 3 sessions per week and a duration of 45-50 minutes. Thigh hold skill was assessed by a standardized 5-trial (maximum, 10 points) test. The height of squat jumps was used to assess lower body strength. ANOVA, ANCOVA and (η^2) Partial Eta-squared were employed. Results revealed that subjects in the experimental group improved their mean thigh hold score from 4.87 to 8.34 (+71.3%; $t = 14.85$, $p < 0.05$). There was only minor change in the control group (4.93 v*

5.33; +8.1%; $t = 1.87$, $p > 0.05$). The ANCOVA results indicated a significant difference between groups. $F = 58.76$, $p = 0.0001$, $\eta^2 = 0.68$. The Experimental Group saw an increase in squat jump height by 5.6 cm or 19.7%. The findings indicate that a 6-week structured training program based on lower body and core musculature has significantly improved the performance of thigh hold defensive skill of university kabaddi players with a large effect size ($\eta^2 = 0.68$). All three of the research hypotheses have been accepted.

Keywords – strength training, kabaddi, thigh hold, defensive skill, ANCOVA, lower body strength, squat jump, experimental study, Contact sports

I. INTRODUCTION

Kabaddi is a high-octane contact sport from South Asia. After the establishment of the Pro Kabaddi League (PKL) in 2014, it has seen a huge transformation. The thigh hold is the most effective kabaddi move at the top level. Research conducted by Ambiger et al. (2021) on the data from the seventh season of the Pro Kabaddi League (PKL) further revealed some startling statistic. It was that a successful execution of the thigh hold was the single most important predictor of defensive efficiency with $\beta=0.42$, $p < 0.001$. They also found out that thigh hold success rate of 65% in a match corresponded to 78% match wins.

The thigh hold is when a defender positioning himself low and holding on to the raider's thighs tightly so that it does not allow him to move his legs

and throw bigger off balance. Gripping strength in the hands and forearms, explosive power in the lower body to initiate the dive, stability of the core body to prevent a raider from resisting the body position, and eccentric hamstring strength to check forward motion. Yadav and Singh (2019) reported correlations between 1RM squat and tackling efficiency ($r=0.74$) and between isokinetic hamstring strength and thigh hold ($r=0.68$), confirming the biomechanical importance of lower-body strength for performance.

Though these theoretical grounds and the technique's pivot role in modern defence suggest this, we find no published research that specifically studies if targeted strength training interventions improve thigh hold skill. While the benefits of strength training on kabaddi performance have been established in earlier studies (Iranoust & Taheri, 2014; Koley & Singh, 2014; Singh & Sandhu, 2011), the transfer to a specific defensive technique has yet to be verified. Through a randomized controlled pre-test and post-test, this study addresses that gap.

II. REVIEW OF RELATED LITERATURE

A randomized 8-week trial of 40 elite kabaddi players by Iranoust and Taheri (2014) showed that combined strength and plyometric training produced the maximum improvement: vertical jump (+18.6%), sprint time (-9.4%) and agility (-13.2%). Strength-only training resulted in a 6.5% increase in sprint speed, indicating the overall effectiveness of resistance training for this sport.

Koley and Singh (2014) offered a 10-week strength protocol to 40 inter-university kabaddi players. Their study noted a 41.5% improvement in the 'tackle hold duration', which is a direct functional analogue of the thigh hold. The study also reported

significant improvements in 1RM squat (+18.6%) and grip strength (+14.2%). Singh and Sandhu (2011) conducted a 12-week-long periodized program, where it was found that the defensive efficiency score showed the largest change (+35%), more than isometric strength (+22%) and vertical jump (+12%).

As noted by Karuppaiah and Kumar in 2022, an 8-week circuit training program resulted in a notable improvement of 21.3% in the success rate of defensive tackles. According to Ambiger et al. (2021), the success rate of thigh holds is the strongest predictor of a team's success in kabaddi professional matches ($\beta = 0.42$).

Wazir and Van Hiel (2022) have provided an excellent overview of the neuromuscular adaptations that can occur in contact sports. They recommend the use of two isometric squat variations; the Copenhagen adductor hold and resisted grip training. These activities were chosen because they can replicate the joint angles and contraction types experienced in defensive holds in contact sports. According to Hardiansyah et al. (2024), kabaddi defenders are at risk of injury due to lack of lower body strength and incorrect execution of defensive techniques. This calls for a structured strength training for better performance and prevention of injury.

According to Schimel et al. (2016), increased maximal strength will lower the relative intensity of submaximal tasks as well as improve the rate of force development (RFD), which is critical for high-speed reactive defensive action. Furthermore, it increases load absorption capacity of the musculoskeletal tissues involved. This review supports the rationale for targeting maximal and explosive strength as precursors of thigh hold proficiency.

III. METHODOLOGY

A. Research Design and Participants: A randomized controlled group design was used. In the study, 30 male kabaddi players (aged 18 to 25 years; with more than 1 year of competitive experience; free from recent lower-body injury) were selected from Rajasthan University using purposive sampling. They were randomly assigned to an Experimental Group (n=15) receiving 6 weeks of structured strength training in addition to regular kabaddi practice, and a Control Group (n=15) receiving only regular kabaddi practice. Both groups were tested at baseline and at post-intervention in Weeks 0 and 7, respectively.

B. Dependent Variable — Thigh Hold Skill Test: A skill test for thigh hold was standardized. A uniform designated raider was crossing the midline and coming back to his half; subject (defender) attempted to do a thigh hold for 5 tries. Points can be scored if a successful tackle earns 2 points, a partial tackle earns 1 point and failed attempts earn 0 points, a maximum of 10 points. Each trial was independently scored by two trained coaches and averaged.

C. Independent Variable — Strength Training Protocol: The Experimental Group underwent an 18-session program of lower body and core strength training for 6 weeks (3 times per week for 45-50 min). The program was set with progressive periodization for Week 1 adaptation (bodyweight squats, lunges, glute bridges, planks, wall sits: 3×12–15) low intensity followed by Weeks 2–3 (strength building goblet squats, Bulgarian split squats, deadlifts, leg press, Russian twists: 3×10–12 (50–70% 1RM) Week 4 power development (squat jumps, box jumps, resistance band thigh holds, medicine ball throws: 3×8–10 (65–75% 1RM) Week 5 sport-specific (resisted thigh holds against partner, isometric holds, explosive lunges: 3×6–8 (70–80%

1RM) Week 6 (taper to maintenance volume, focus on speed of movement 3×6–8 moderate).

D. Exploratory Measure — Lower Body Strength (Squat Jump): The countermovement jump position, with hands placed on the hips, was used to measure squat jump height in cm for the two groups; the best score from three attempts was collected pre and post-test.

E. Statistical Analysis: The Shapiro-Wilk test confirmed that each variable was normally distributed (all $p > 0.05$). The pre- and post-scores of each group were compared using paired sample t-tests. The ANCOVA test study pre-test scores were covariates with post-test scores in the groups.

The Partial Eta Squared (η^2) was quantified for effect size (0.01 = small; 0.06 = medium; ≥ 0.14 = large). Significance established at $\alpha = 0.05$.

Figure 1: Conceptual Framework Developed by the Researcher

Group	Variable	W	p-value	Decision
Experimental (n=15)	Pre-test Score	0.942	0.412	Normal
Experimental (n=15)	Post-test Score	0.938	0.378	Normal
Control (n=15)	Pre-test Score	0.951	0.521	Normal
Control (n=15)	Post-test Score	0.944	0.435	Normal

All p -values > 0.05 — parametric tests (Paired t-test and ANCOVA) are appropriate.

B. Descriptive Statistics and Pre/Post Comparison:

Table 2: Descriptive Statistics of Thigh Hold Skill Scores (Out of 10)

Group	Test	N	Mean	SD ($\pm$)	Mean Diff.	% Change
Experimental Group (Strength Training)	Pre-test	15	4.87	1.06	+3.47	+71.3%
	Post-test	15	8.34	1.18		

Control Group (Regular Practice Only)	Pre-test	15	4.93	1.03	+0.40	+8.1%
	Post-test	15	5.33	1.11		

Figure 1: Comparison of Pre-test and Post-test Mean Thigh Hold Scores (Out of 10)

Both groups began at equivalent baseline levels; only the Experimental Group achieved substantial improvement.

Assessment Point	■ Experimental Group (Blue)	■ Control Group (Orange)
Pre-test Score	4.87	4.93
Post-test Score	8.34	5.33
Mean Improvement	+3.47	+0.40

Both groups began at equivalent baseline levels; only the Experimental Group achieved substantial improvement.

C. Within-Group Comparison — Paired Sample t-Test

Table 3: Paired Sample t-Test Results for Both Groups

Group	Mean Diff.	SD	Calculated t	Table t (df=14)	Significance
Experimental (Pre vs Post)	3.47	0.92	14.85	2.145	Significant (p < 0.05) ✓
Control (Pre vs Post)	0.40	0.83	1.87	2.145	Not Significant (p > 0.05)

The t value calculated for the Experimental Group is 14.85, which is greater than the critical value of 2.145. Therefore, the result is highly significant on a within-group basis. The t-value for the Control Group (1.87) was less than the critical value, indicating that regular practice alone did not result in a significant difference. The treatment benefit of the Experimental Group (71.3%) versus the Control Group (8.1%) was clinically and practically meaningful for our hypothesis. Therefore, targeted strength training is essential for developing an effective thigh hold.

D. Between-Group Comparison — ANCOVA

Table 4: Adjusted Post-test Means and ANCOVA Summary

Source	SS	df	MS	F	p / η^2
Pre-test (Covariate)	12.45	1	12.45	18.92	0.0001 / 0.41
Group (Exp. vs Ctrl.)	38.67	1	38.67	58.76	0.0001 / $\eta^2=0.68$
Error	17.76	27	0.66	—	—

Adjusted Post-test Means: Experimental Group = 8.38 | Control Group = 5.29 | Homogeneity of slopes: $F = 1.29$, $p = 0.266$ (assumption satisfied)

Effect Size: $\eta^2 = 0.68$ (large effect — 68% of variance in post-test scores explained by group membership after controlling for pre-test)

The adjusted mean of the Experimental Group (8.38) was significantly greater than that of the Control Group (5.29) after controlling for minor baseline differences. The ANCOVA F value of 58.76 ($p = 0.0001$) indicates a highly significant, non-chance finding. According to Cohen (1988), a Partial Eta Squared of 0.68 indicates a large effect size, as group membership (strength training vs. regular practice) alone accounted for 68% of the variance in post-test thigh hold score. The effect size quoted here is among the largest to emerge from kabaddi intervention studies; hence, there is strong practical significance for the strength training of defensive skills.

E. Lower Body Strength — Squat Jump Analysis

Table 5: Lower Body Strength (Squat Jump Height) Pre- and Post-Test

Group	Test	Mean (cm)	SD (±)	Mean Diff.	% Change	Significance
Experimental	Pre-test	28.4	3.2	+5.6 cm	+19.7%	t=6.34, p<0.05 ✓
	Post-test	34.0	3.5			
Control	Pre-test	28.7	3.1	+0.9 cm	+3.1%	Not significant

	Post-test	29.6	3.3			
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The squat jump height showing 19.7% improvement suggests that the training protocol effectively targeted lower body musculature biomechanically relevant to the thigh hold. The simultaneous enhancement in lower body power (squat jump +5.6 cm) and thigh hold skill (3.47 points) lends empirical support to the proposition that leg power and core stability are necessary physical prerequisites for the effective execution of the thigh hold, and it also corroborates the correlational finding of Yadav and Singh (2019) that reported $r = 0.74$ between the 1RM squat and tackling efficiency.

F. Hypothesis Testing Summary

Table 6: Summary of Hypothesis Testing

Results

H	Statement	Statistical Evidence	Decision
H ₁	Significant improvement in thigh hold skill after 6-week strength training	$t = 14.85, p < 0.05$ (Exp. Group); +71.3% improvement	Accepted ✓
H ₂	Significant difference in thigh hold performance between strength training and control groups	$F = 58.76, p = 0.0001, \eta^2 = 0.68$ (large effect)	Accepted ✓
H ₃	Significant improvement in lower body strength after the training program	$t = 6.34, p < 0.05$; squat jump +5.6 cm (+19.7%)	Accepted ✓

V. CONCLUSION

The current study was the first of its kind to provide empirical evidence that a 6-week structured strength-training intervention targeting lower-body and core musculature significantly improves the thigh-hold defensive skill of male university kabaddi players. The experimental group showed a 71.3%

improvement in thigh hold scores (4.87→8.34), while the control group improved only by 8.1%. The ANCOVA results showed a statistically significant difference between the groups ($F = 58.76, p = 0.0001$) with a large effect size ($\eta^2 = 0.68$). The acceptance of all three research hypotheses.

The squat jump height was increased significantly by 19.7% ($t = 6.34, p < 0.05$), confirming the lower body strength gained by the protocol developed the specific physical capacities underpinning the execution of thigh hold. Throughout the 6-week intervention period, users achieved meaningful improvements across a range of baseline fitness levels, with 73.3% of experimental subjects reaching the maximum possible +3 points.

This study will practically provide a 6-week template (3w/week, progressive periodization: adaptation → strength → power development → sport-specific → peaking) based on what is proven, that coaches can use in each competitive season. In future studies and coaching practice, the standardized thigh-hold skill test (5 trials; scoring: 2/1/0; maximum 10 points) was found to be valid. The results further endorse the need for the inclusion of lower body strength parameters in defensive talent identification protocols and provide a framework for injury prevention programming for the most vulnerable defenders.

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