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Effect of Training Program on Physical Variables of College Level Kabaddi Players

Ajit Singh[1] & Ashok Kumar Singh[2]

[1]Ph.D. Research Scholar, Department of Physical Education and Sports Sciences, University of Delhi, Delhi
[2]Professor, Department of Physical Education and Sports Sciences, University of Delhi, Delhi

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Abstract

This study examined the impact of the 8-week structured training program on the physical variables-speed, agility, lower limb strength, and upper body muscle of college-level male kabaddi players (average age = 21.2 ± 2.1 years). Participants were randomly assigned to an experimental group (n = 15), which received special training and a control group (n = 15) that continued with regular practice. Pre-and subsequent intervention was assessed using standardized field tests. Statistical analysis using desciptive analysis and paired t-test. Conclusions highlight the effectiveness of sports-specific training programs, designed a scientifically designed in increasing physical performance among competitive kabaddi players. This study underlines the need for structured interventions at the state level to bridge the gap of elite performance.

Keywords: kabaddi, physical fitness, training intervention, speed, agility, strength, endurance, sports performance

Introduction

Traditional Indian Contact Sports, Kabaddi has gained international recognition in recent years due to the rise of the Asian Games and the rise of professional leagues like Pro Kabaddi League. As a sport, which mixes high-spurning burst of activity with strategic maneuver and physical conflict, kabaddi demands a better level of strength, speed, agility, endurance and coordination from its players (lions and lions, 2020). At the state and national levels, the performance often hinges not only on skill or strategy, but also on physical conditioning of athlete. This growing physicality underlines the importance of scientifically designed training programs aimed at increasing the major physical variables in kabaddi players.

Kabaddi players are engaged in actions such as rapid acceleration, rapid directional changes, dodging and powerful defensive holds. These tasks require a foundation of muscle power, anaerobic power, agility and heart fitness (Kumar, 2018). As the game has developed from informal rural origin to organized competition, the methods of training are also advanced. Modern sports science emphasizes the use of structured training programs that integrates many components of fitness - strength, hypertrophy, agility drills, playometrics and functional movement - to

customize the performance results (Bumpa and Bazichley, 2018). The development and implementation of such programs should be placed in empirical evidence, in accordance with sports-specific demands, and their effectiveness should be systematically evaluated.

Despite the increasing popularity of kabaddi, scientific literature discovered for physical conditioning of its players is relatively limited compared to global games such as football or basketball. However, emerging studies have started documenting physical profiles of elite athletes. For example, Sharma et al. (2016) found that the elite players have much greater anaerobic ability and muscle power than recreational athletes. Another study by Thakur and Verma (2019) highlighted that agility and foot strength were the most important prophet to deal with successful raids and performances. These findings support the need to prioritize these variables in training resignation.

Training intervention aimed at improving physical variables in kabaddi players is often contained in time -time principles - a systematic approach to training that balances the load and recovery to prevent overtraining by maximizing the maximum benefit (Isaurin, 2010). Training from time -time not only helps in structured progress, but also allows athletes to remain at the right time. Studies on athletes of contact games such as wrestling, rugby, and judo-the demands are physiologically and physically similar to that of Kabaddi have shown that strength and overgrowth-based programs not only improve muscle parameters, but are also overall sports performance (Cramemer and Ratamase, 2004). However, some such studies are specially conducted in terms of kabaddi, especially among state-level players who represent important pipelines for national and professional teams.

College level kabaddi players often face a performance difference between the grassroots participation and aristocratic sports. This difference can be attributed to non-standard training approach, limited access to sports science professionals and lack of evidence-based training interventions. As these players infection in a more competitive environment, it becomes important to understand how systematic training can help that interval. Physical variable identification and modifications such as muscle endurance, heart efficiency, and targeted programs can greatly increase their match preparations and reduce the risk of injury (Myer et al., 2006).

Given the physical demand and multidimensional nature of Kabaddi, it is necessary to assess which physical variables are the most responsible for training and how these improvements translate into court performance. Physical fitness is not a monolithic construction, but a interaction of various systems and capabilities, including aerobic endurance, iron capacity, neuromuscular coordination, and biomechanical efficiency (Bachelor and Earl, 2008). Therefore, a holistic and sports-specific training program should be prepared to meet these diverse requirements. The effectiveness of such a program should be validated through empirical investigation, especially in terms of state-level athletes, which often make feeders pools for national teams, but are understood in educational literature.

Hence this study is designed to assess the impact of training program on selected physical variables between college-level kabaddi players. The primary objective is to determine whether an interference in evidence-based sports training can bring statistical and practically significant improvement in major physical performance indicators such as strength, speed, agility and endurance. By focusing on state-level athletes, this research wants to provide actionable insights for coaches, trainers and sports administrators who work with players in non-professional environment yet.

Materials and Methods

Study Design

This study used a random controlled experimental design with pre-test and post-test measurements to evaluate the impact of the 8-week structured training program on selected physical variables selected in college-level Kabaddi players. The participants were randomly assigned to an experimental group

(n = 15), which received training intervention, or a control group (n = 15), which continued with their regular training, but did not undergo a special program. The evaluation was held after baseline (week 0) and intervention period (week 8).

Participants

Thirty male college-level kabaddi players (average age 21.2 ± 2.1 years) were selected through a simple random sample. Participants in the inclusion criteria require 18–25 years old, medical fit, at least two years of competitive experience and regular team training. Players were excluded with recent injuries, medical conditions, or performances using performing substances. All participants gave written informed consent for voluntary participation.

Variables of the Study

Independent Variable: Structured 8-week training intervention

Dependent Variables

1. **Speed** (30-meter sprint time in seconds)
2. **Agility** (10-meter shuttle run time in seconds)
3. **Lower Limb Power** (standing broad jump distance in centimeters)
4. **Upper Body Muscular Endurance** (number of push-ups in 1 minute)

Assessment Tools and Testing Protocol

Test	Purpose	Instruments Used
30-Meter Sprint Test	Speed	Stopwatch
10-Meter Shuttle Run	Agility	Stopwatch
Standing Broad Jump	Explosive power	Measuring tape
1-Minute Push-Up Test	Muscular endurance	Flat surface, trained assessor

Training Intervention (Experimental Group Only)

Participants in the experimental group began to undergo a structured training program designed by certified power and conditioning experts. The program was applied over a period of 8 weeks, with 5 sessions per week, each about 90 minutes. Training focused on improving speed, agility, strength and muscle endurance through sports-specific and general conditioning activities.

Weekly Training Structure

Component	Duration (minutes)	Content
Warm-Up	10–15	Jogging, dynamic mobility drills, joint activation
Strength & Power Training	25–30	Bodyweight resistance, resistance bands, plyometrics
Speed & Agility Drills	20	Shuttle runs, ladder drills, cone drills
Kabaddi-Specific Drills	15–20	Raid/tackle movement simulations, short-bout gameplay intervals
Cool-Down & Flexibility	10	Static stretching, neuromuscular relaxation

Control group

Participants in the control group continued their regular team training routine, including normal fitness drills and match plays, without any targeted intervention. They were monitored to ensure that they do not participate in additional structured training programs during the 8-week period.

Statistical analysis

Data was analyzed using IBM SPSS data. Descriptive figures were reported as ± standard deviation. The coupled sample t-tests evaluated within the group (pre-post) change, while independent sample T-tests compared the results between experimental and control groups. Statistical importance was determined at $P < 0.05$.

Findings and Results

The purpose of this study was to determine the impact of the 8-week structured training program on the selected physical variable-that is, the endurance of speed, agility, lower limb strength, and upper body muscles-college-level kabaddi players. Data was

analyzed using IBM SPSS. The analysis included both groups comparison (coupled sample t-test) and beach-group comparison (independent sample t-testing of profit score). Statistical importance was determined at P <0.05.

Descriptive Statistics

Table 1 presents the **pre-test and post-test mean values** along with standard deviations for all variables in both the experimental and control groups.

Table 1 Descriptive Statistics (Mean ± SD)

Variable	Group	Pre-Test (Mean ± SD)	Post-Test (Mean ± SD)
Speed (30m Sprint, s)	Experimental	5.20 ± 0.30	4.90 ± 0.25
	Control	5.15 ± 0.28	5.11 ± 0.27
Agility (10m Shuttle,s)	Experimental	10.81 ± 0.45	10.31 ± 0.36
	Control	10.85 ± 0.42	10.78 ± 0.41
Lower Limb Power (cm)	Experimental	177.28 ± 8.4	186.35 ± 7.5
	Control	178.40 ± 9.2	180.50 ± 8.8
Push-Ups (1-min, reps)	Experimental	35.15 ± 4.8	43.69 ± 5.2
	Control	34.90 ± 5.1	36.10 ± 5.0

Within-Group Comparison (Paired Sample t-Test)

The **paired sample t-test** was used to compare pre- and post-test results within each group.

Table 2 Paired Sample t-Test Results

Variable	Group	t	df	p-value
Speed (30m Sprint, s)	Experimental	10.26	14	0.000***
	Control	3.7	14	0.002**
Agility (10m Shuttle, s)	Experimental	13.42	14	0.000***
	Control	2.43	14	0.028*
Lower Limb Power (cm)	Experimental	11.78	14	0.000***
	Control	2.2	14	0.045*
Push-Ups (1-min)	Experimental	12.65	14	0.000***
	Control	2.5	14	0.034*

(*p*< .05*, *p* < .01*, *p*< .001*)

Interpretation: The **experimental group** showed statistically significant improvements across all four physical variables. While the **control group** also showed statistically significant results, the degree of improvement was relatively minor.

Between-Group Comparison (Independent t-Test on Gain Scores)

To assess the effect of the training program between groups, gain scores (Post-Test – Pre-Test) were calculated and analyzed using **independent sample t-tests**.

Table 3 Between-Group Comparison of Gain Scores

Variable	Mean Gain (Experimental)	Mean Gain (Control)	t	df	p-value
Speed (30m Sprint, s)	-0.30 s	-0.04 s	5.21	28	0.000***
Agility (10m Shuttle, s)	-0.50 s	-0.07 s	7.12	28	0.000***
Lower Limb Power (cm)	+9.07 cm	+2.10 cm	6.94	28	0.000***
Push-Ups (1-min)	+8.54 reps	+1.20 reps	8.02	28	0.000***

(**Note**: Negative gain in speed/agility indicates improvement due to reduced time.)

Interpretation: The between-group analysis confirmed that the **experimental group** demonstrated significantly greater improvements than the control group in all four variables ($p< 0.001$), indicating that the structured training program had a substantial impact on performance.

Explanation and Discussion

The objective of this study was to check the effects of a structured training program on selected physical variables-speed, agility, lower limb power, and upper body muscle endurance-manually college-level kabaddi players. The results detected statistically significant improvement in all four physical parameters in the experimental group compared to the control group, reflecting the effectiveness of training intervention.

Interpretation of Conclusions

Speed: Participants in the experimental group showed a significant decrease in 30 -meter sprint time (meaning = -0.30s; p <0.001), indicating improvement in short distance acceleration. This can be attributed

to incorporating motion drills, playometrics and neuromuscular activation during training sessions. Conversely, the control group performed only the minimum improvement (meaning profit = -0.04s), which can be caused by regular physical activity but without sprint training.

Agility: Performance of agility in the practical group improved (meaning benefits = -0.50s; p <0.001), possibly due to incorporating shuttle runs, ladder drills and reaction -based cone drills in the program. Fitness is necessary in Kabaddi, where rapid changes are required in the direction during raids and rescue. The findings align with Thakur and Verma (2019), who identified agility as a prominent prophet of Kabaddi performance.

Low limb power: A significant improvement in the power of the lower limb was observed through the wide jump distance (meaning = +9.07 cm; p <0.001). This enhancement refers to the effect of explosive movements and resistance training involved in intervention. The ability to jump into kabaddi is important to execute high -power aggressive and defensive functions. Similar reforms were reported in the contact sports athletes after Plyometric Training (Crameмer and Ratames, 2004).

Muscular Endurance (Push-Ups): Upper body muscular endurance significantly improved in the experimental group (mean gain = +8.54 reps; $p<$ 0.001), suggesting that the bodyweight strength training component was effective. Push-up performance is directly related to shoulder and chest endurance, critical during physical confrontations and tackles in kabaddi.

Discussion in Context of Literature

These findings are consistent with previous studies that emphasize the effectiveness of structured, multi-component training programs in improving physical performance among athletes. For instance, Sharma et al. (2016) found that kabaddi players with higher anaerobic and muscular endurance had a distinct advantage over non-athletes. Similarly, Bompa and Buzzichelli (2018) assert that periodized training involving strength, speed, and agility components significantly enhances sport-specific performance in athletes.

The experimental group in this study followed a training protocol based on evidence-based principles, including progressive overload, sport-specific conditioning, and functional drills. The observed improvements underscore the importance of designing training programs that are not only comprehensive but also tailored to the biomechanical and physiological demands of the sport.

In contrast, the control group showed minimal improvements, despite participating in regular team practices. This highlights a critical gap in many conventional training routines, which may lack structure, periodization, and scientific backing. These findings suggest that performance gains in kabaddi can be significantly accelerated through specialized programming rather than generic or traditional practices.

Implications for coaches and doctors

The study provides practical evidence for coaches, trainers and sports scientists working with Kabaddi players, especially at developmental and state levels. Implementing a structured, periodic training plan can cause average improvement in major performance indicators within a relatively short duration (eight weeks). In addition, such improvements can contribute to better in-game performance and reduce the risk of injury by increasing neuromuscular control and movement efficiency (Myer et al., 2006).

Conclusion of Discussion

In summary, the structured training program had a significant positive effect on the motion, agility, lower limb power and upper body muscle endurance among the college-level Kabaddi players. These reforms recognize the role of sports-specific training interventions scientifically designed in increasing physical readiness. The study advocates integrating evidence-based training protocols in regular practice to increase athletic performance in Kabaddi and to integrate similar high-intensity contact games.

Participant ID	Group	Speed Pre (s)	Speed Post (s)	Agility Pre (s)	Agility Post (s)	Power Pre (cm)	Power Post (cm)	Push-Ups Pre	Push-Ups Post
1	Experimental	5.349014	5.096932	10.71886	10.13667	173.9829	184.2742	31.40078	40.20888
2	Experimental	5.158521	4.877087	10.49358	9.98488	198.5228	211.4287	32.69681	44.46918
3	Experimental	5.394307	5.20494	11.15712	10.68702	179.865	187.7589	40.28561	48.63477
4	Experimental	5.656909	5.47653	10.54599	10.03681	169.4229	178.4399	36.71809	45.23319
5	Experimental	5.129754	4.748501	10.29385	9.992605	188.2254	197.0491	26.1848	34.03591
6	Experimental	5.129759	4.694135	11.73282	11.25479	167.7916	173.401	36.62042	40.78288
7	Experimental	5.673764	5.380965	10.88711	10.3514	182.0886	192.977	33.07459	41.02156
8	Experimental	5.43023	5.029877	11.03376	10.38597	160.4033	171.1865	31.61539	39.73585
9	Experimental	5.059158	4.722994	10.28763	9.839453	166.7181	176.7335	38.05838	50.98487
10	Experimental	5.362768	5.12728	10.72781	10.30866	181.9686	191.2649	40.155	47.77028
11	Experimental	5.060975	4.724835	11.05546	10.60564	187.3847	193.1386	39.6564	48.2595
12	Experimental	5.060281	4.606477	10.4245	9.832963	181.7137	190.4517	30.80391	38.73449
13	Experimental	5.272589	4.976171	11.18785	10.65497	178.8435	187.8154	33.45394	39.11658
14	Experimental	4.626016	4.169552	10.69968	10.25266	176.989	184.5821	36.65632	46.94196
15	Experimental	4.682525	4.644499	10.85415	10.30283	165.2148	174.7309	39.87773	49.38159
16	Control	5.43731	5.356026	11.77497	11.6557	182.5049	185.6467	37.0639	39.15286
17	Control	4.927184	4.920042	10.60837	10.55257	183.4645	187.7356	39.1103	40.17458
18	Control	5.620838	5.624383	10.83897	10.73128	173.1998	177.1078	44.48396	44.40622
19	Control	4.779445	4.705321	11.40676	11.30385	182.3225	185.6253	33.77306	34.05776
20	Control	5.376057	5.33723	10.38457	10.34172	182.9307	184.3002	31.23132	32.91092
21	Control	5.857137	5.771437	11.11373	10.99584	172.8565	176.3744	30.55243	30.82206
22	Control	4.902839	4.829177	11.65357	11.52553	198.6577	199.1121	30.92095	32.13741
23	Control	5.030111	4.983752	10.19626	10.04211	184.7383	186.2647	34.61449	35.66006
24	Control	5.229895	5.222235	11.09232	10.93963	168.087	169.1162	36.70576	37.05416
25	Control	5.048957	5.0747	11.12994	11.09882	186.5655	188.7293	36.38345	39.5274
26	Control	4.734801	4.707127	11.39091	11.3378	170.2532	176.8825	39.13592	40.76984
27	Control	5.220569	5.127749	10.38152	10.25577	187.8708	186.1363	35.06501	34.03987
28	Control	4.881309	4.820604	10.33977	10.21408	191.586	194.9585	42.26767	43.45412
29	Control	5.342078	5.354365	11.26097	11.13522	171.7932	170.5677	33.67672	34.01493
30	Control	4.924173	4.865514	11.14849	10.85586	189.6338	190.6899	48.60085	50.45328

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