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EFFECT OF COMPLEX TRAINING PROGRAMME ON PHYSICAL FITNESS PARAMETERS OF ADOLESCENT BOYS KABADDI PLAYERS

Mr. D. Ranjith[1], Dr. K.Tamizhmaran[2]
[1]*Master of Physical Education ,Sri Ramakrishna Mission Vidyalaya Maruthi College of Physical Education, Coimbatore, Tamil Nadu, India*
[2]*Assistant Professor, Sri Ramakrishna Mission Vidyalaya Maruthi College of Physical Education, Coimbatore, Tamil Nadu, India.*

ABSTRACT
Complex training increases muscle strength by making your muscles work against a weight or force. Different forms of complex training programme include using free weights, weight machines, resistance bands and your own body weight. This experimental study aimed to investigate the effects of a complex training programme on physical fitness parameters of adolescent boys who are kabaddi players. A pre-test and post-test randomized group design was employed, consisting of an experimental group and a control group. A total of thirty (N = 30) participants aged between 14 -16 years were randomly assigned into two equal groups: Group I (n = 15), designated as the experimental group, and Group II (n = 15), designated as the control group. The experimental group participated in a structured complex training programme for a duration of 12 weeks, with training sessions conducted three times per week (Monday, Wednesday, and Friday), each lasting 60 minutes. In contrast, the control group did not undergo any specific training intervention. Physical fitness parameters were assessed for all participants before and after the intervention period. The variables measured included speed, muscular strength endurance, and leg explosive power. Statistical analysis was performed using the paired t-test to determine the significance of differences between pre-test and post-test mean scores within and between groups. The level of significance was set at 0.05. The results revealed a statistically significant improvement in the experimental group across all selected physical fitness parameters, whereas no significant changes were observed in the control group. These findings indicate that complex training has a positive and significant effect on enhancing speed, muscular strength endurance, and leg explosive power. In conclusion, the study demonstrates that complex training is an effective method for improving multiple components of physical fitness among school-level adolescent boys who are kabaddi players. Furthermore, it is suggested that increasing the frequency of training sessions per week may lead to additional improvements in overall fitness performance.

KEYWORDS: *Complex Training, Speed, Muscular Strength Endurance And Leg Explosive Power.*

INTRODUCTION

Kabaddi is a physically demanding contact sport that requires a combination of power, aggression, agility, fine neuromuscular coordination, and rapid reflex responses. Due to its high-intensity and contact-based nature, players are exposed to a greater risk of injuries during both training and competitive play. Despite its growing popularity, there is a paucity of scientific literature addressing the incidence and management of sports injuries associated with kabaddi. Therefore, this review aims to provide a foundational framework for the global recognition of kabaddi and its related injury patterns, with the objective of enhancing awareness within the sports medicine community and encouraging further research in this domain. In addition to its competitive aspects, kabaddi offers numerous physical, psychological, and social benefits. Regular participation contributes to improvements in physical fitness, muscular strength, and cardiovascular endurance. It also enhances speed, agility, and flexibility, while promoting neuromuscular coordination. Furthermore, the sport fosters teamwork, cooperation, and effective communication among players. It plays a significant role in improving concentration, quick decision-making ability, and mental alertness. Participation in kabaddi also helps in building self-confidence, discipline, and resilience, while encouraging sportsmanship and aiding in stress reduction.

Complex training is a widely recognized training modality frequently applied in athletic conditioning and extensively examined in sports science literature. It integrates resistance training (RT) and plyometric training (PT) within a single training session to enhance muscular power and overall kabaddi players performance. Although most sports scientists and coaches agree on the importance of combining resistance training and plyometric training in kabaddi players training regimens, the effectiveness of complex training as a superior training method remains equivocal. Previous studies investigating complex training have reported mixed findings, with some demonstrating significant improvements in kabaddi players performance, while others have shown limited or no effects. These inconsistencies may be attributed to several influencing variables, including the intensity and type of preload exercises, the rest interval between resistance and plyometric components, and the sequencing of exercises. Furthermore, individual factors such as gender, training status, training age, and baseline strength levels of participants may also significantly influence the outcomes of complex training interventions. Despite these variations, complex training has been associated with

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several performance-related benefits, particularly in sports like kabaddi. It contributes to improvements in muscular strength and power, which are essential for effective raiding and tackling. Additionally, it enhances speed and agility required for rapid directional movements and game-specific actions. The training also promotes explosive performance, including jumping ability and sudden changes in direction. Moreover, it improves neuromuscular coordination and balance during match play, while enhancing endurance and overall physical fitness. Importantly, complex training may also reduce the risk of injuries by strengthening muscles, joints, and connective tissues.

METHODOLOGY

The primary objective of this study was to investigate the effect of a complex training programme on selected physical fitness parameters among adolescent boys who are kabaddi players. For this purpose, thirty (N = 30) adolescent boys studying in various schools namely Suburban Higher Secondary School and St. Michael's Higher Secondary School in Coimbatore district were selected as participants. The subjects were randomly divided into two equal groups: an experimental group (n = 15) and a control group (n = 15). The participants in the experimental group volunteered to undergo the complex training programme, whereas the control group did not participate in any structured training intervention during the study period. The training programme was implemented over a duration of 12 weeks, with sessions conducted in the morning from 6:30 a.m. to 7:30 a.m., each lasting 60 minutes. To evaluate the effectiveness of the intervention, pre-tests and post-tests were administered to both groups before and after the training period. The selected physical fitness parameters included speed, muscular strength endurance, and leg explosive power. Speed was assessed using the 50-meter dash and recorded in seconds. Muscular strength endurance was measured the sit-up test and expressed as the number of repetitions per minute. Leg explosive power was evaluated using the standing broad jump and recorded in meters.

TRAINING PROGRAMME

During the intervention period, the experimental group participated in a systematically structured complex training programme in addition to their routine daily activities. The training was conducted over a duration of 12 weeks, with sessions scheduled three times per week on alternate days (Monday, Wednesday, and Friday). The training protocol was developed based on an extensive review of relevant literature, including books, academic journals, electronic resources, and expert consultation. Each training session lasted 60 minutes and followed a standardized format: 10 minutes of flexibility exercises (stretching), followed by 10 minutes of general warm-up, 30 minutes of core complex training (integrating resistance and plyometric exercises), and concluding with 10 minutes of cool-down activities to facilitate recovery. All fifteen participants in the experimental group were closely supervised throughout the training period to ensure adherence, proper technique, and safety. Notably, no incidences of injury, muscle strain, or delayed onset muscle soreness were reported, indicating that the training programme was safe, well-tolerated, and appropriately prescribed for the participants

STATISTICAL ANALYSIS

The data obtained for the selected physical fitness variables were subjected to statistical analysis to evaluate the effectiveness of the 12-week training intervention. Pre-test and post-test scores were analysed using the paired sample *t*-test, which is appropriate for determining within-group differences over time. The level of significance was set at 0.05 ($p < 0.05$), representing a 95% confidence interval for establishing statistical significance. This indicates that there is only a 5% probability that the observed differences occurred by chance. The application of the paired *t*-test enabled the researcher to determine whether the changes observed in the physical fitness parameters such as speed, muscular strength endurance, and leg explosive power were statistically meaningful following the training programme

Table 1
Computation of the 't' ratio on the experimental group and the control group selected physical fitness parameters on adolescent boys kabaddi players.

Group	Variables	Test	Mean	Standard Deviation	Standard Error Mean	't' Ratios
Experimental Group	Speed	Pre Test	7.42	0.45	0.041	2.16*
		Post Test	7.33	0.46		
	Muscular Strength Endurance	Pre Test	35.40	3.99	1.022	2.80*
		Post Test	38.26	3.19		
	Leg Explosive Power	Pre Test	1.96	0.20	0.023	3.70*
		Post Test	2.05	0.11		
Control Group	Speed	Pre Test	7.43	0.35	0.013	1.00
		Post Test	7.44	0.31		
	Muscular Strength Endurance	Pre Test	35.33	1.87	0.248	0.26
		Post Test	35.40	1.91		
	Leg Explosive Power	Pre Test	1.94	0.15	0.017	0.54
		Post Test	1.95	0.18		

*****Significant at 0.05 level, Table value for df 14 was 2.14.

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Table 1 presents the computed mean, standard deviation, and t-ratio for the selected physical fitness parameters, namely speed, muscular strength endurance and leg explosive power of the experimental group. The obtained 't-ratios were 2.16 for speed, 2.80 for muscular strength endurance and 3.70 for leg explosive power respectively. The critical table value for statistical significance at the 0.05 level with 14 degrees of freedom was 2.14. As the calculated 't' values exceeded the table value, the differences were found to be statistically significant.

This indicates that the complex training program had a significant positive effect on all three variables in the experimental group. In contrast, the control group showed 't'-ratios of 1.00 for speed, 0.26 for muscular strength endurance and 0.54 for leg explosive power. Since these values were lower than the required table value of 2.14, the differences were not statistically significant. This suggests that, in the absence of complex training, there was no meaningful improvement in the physical fitness parameters of the control group.

DISCUSSION FINDING

The present study aimed to examine the effect of a complex training programme on selected physical fitness variables namely speed, leg explosive power, and muscular strength endurance among adolescent boys who are kabaddi players. The findings of the study revealed a statistically significant improvement in all the selected physical fitness components following the training intervention. The enhancement in speed can be attributed to the integration of resistance and plyometric exercises within the complex training protocol, which facilitates neuromuscular adaptation and improves the rate of force development This enables players to execute rapid movements efficiently during both offensive (raiding) and defensive actions. The observed improvement in leg explosive power is primarily due to the inclusion of plyometric drills such as jumping and bounding exercises. These activities enhance the efficiency of the stretch-shortening cycle, allowing for greater force production in a minimal time frame, which is essential for dynamic and explosive movements in kabaddi. Similarly, the increase in muscular strength endurance may be associated with repetitive resistance and bodyweight exercises incorporated in the training programme. These exercises improve muscular endurance capacity, enabling players to sustain prolonged physical effort and delay the onset of fatigue during match play. In conclusion, complex training can be considered an effective and scientifically supported training modality for enhancing key physical fitness attributes that are critical for optimal performance in kabaddi.

CONCLUSION

The results of the present study demonstrate that the 12-week complex training programme produced significant improvements in key physical fitness variables among the experimental group. Specifically, statistically significant enhancements were observed in speed, leg explosive power, and muscular strength endurance when comparing pre-test and post-test performances. These improvements may be attributed to the synergistic effect of resistance and plyometric training, which enhances neuromuscular coordination, increases rate of force development, and improves muscular endurance capacity. Furthermore, when compared to the control group, the experimental group showed superior gains across all measured variables, indicating the effectiveness of the training intervention. This suggests that complex training is a highly efficient conditioning method for improving multiple components of physical fitness simultaneously. Overall, the findings confirm that structured complex training can significantly enhance performance-related fitness attributes in adolescent kabaddi players.

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