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IMPACTS OF COMPLEX TRAINING ON SELECTED FITNESS PARAMETERS AMONG FOOTBALL PLAYERS

Mr. K. Manikandan[1], Dr. S. Senthil Kumaran[2*]

[1]*M. P. Ed II Year Student, General & Adapted Physical Education and Yoga (GAPEY), Ramakrishna Mission Vivekananda Educational & Research Institute (Deemed University), Coimbatore, Tamil Nadu.*

[2*] *Assistant Professor, General & Adapted Physical Education and Yoga (GAPEY), Ramakrishna Mission Vivekananda Educational & Research Institute (Deemed University), Coimbatore, Tamil Nadu.*

ABSTRACT

The study aimed to investigate the impacts of complex training on selected fitness parameters such as speed, leg explosive power and leg strength among college-level male football players. Thirty participants were randomly divided into two groups: a complex training group (n=15) and a control group (n=15). The experimental group underwent an eight-week complex training program combining resistance and plyometric exercises, while the control group followed their routine activities. The training was organized into four progressive phases, emphasizing foundational strength, power development, and neuromuscular efficiency. Pre- and post-test data were analyzed using the dependent 't'-test at a 0.05 level of significance. The results revealed significant improvements in the experimental group for speed (t = 97.55), leg explosive power (t = 12.50), and leg strength (t = 23.19), while no significant changes were observed in the control group. These findings confirm that complex training effectively enhances physical performance variables crucial for football, particularly those related to explosive movements, strength, and agility. The study concludes that systematic complex training contributes to improved overall athletic performance among college level football players compared to traditional training methods.

KEYWORDS: *Complex Training, Football Players, Strength, Speed, Leg Explosive Power, Physical Fitness*

1.INTRODUCTION

Football is a fast-paced and physically demanding sport that requires a high level of fitness, including strength, speed, endurance, agility, and power. To meet these demands, athletes must engage in specialized training programs that enhance various physical and performance-related qualities. One such modern and effective method is complex training, which involves the combination of heavy resistance exercises followed immediately by explosive plyometric movements within the same session. This technique is based on the principle of post-activation potentiation (PAP), which enhances muscle performance by activating the nervous system and improving muscular power **(Docherty, Robbins & Hodgson, 2004).**

Complex training helps improve muscle strength, coordination, and the explosive ability needed for sprints, jumps, and quick changes in direction—all essential skills for football players. Unlike traditional training methods that focus on strength or power separately, complex training merges both, offering more comprehensive and efficient development. Research has shown that athletes using complex training experience improvements in sprinting speed, vertical jump height, and muscular endurance, making it a valuable tool for enhancing athletic performance **(Ebben & Watts, 1998).**

2.HYPOTHESES

The formulated hypotheses in the present study were follows.

1. It was hypothesized that there would be significant improvement on selected fitness parameters of college level men football players due to complex training.
2. It was hypothesized that in enhanced the selected fitness parameters, the performance of players pertain to complex training would perform better than the players practicing traditional play.

3.METHODS

3.1 Experimental Design

The study was formulated as pre-test and post-test randomized groups design, based on the voluntary response to participate in, thirty college level men football players were selected and they were divided into two equal groups namely complex training group and control group. The selected subject (N=15) was divided into two groups (n=15) of which underwent complex training and group II was considered as control group (CG). The complex training group underwent the speed, leg explosive power and leg strength exercises for a period of eight weeks. After Pre-test, Group I was treated with complex training, group II was not treated with any training but they were doing their regular activity.

3.2 Training Program

The **complex training programme** was systematically organized into four progressive phases spread across **eight weeks**, aiming to enhance strength, power, and overall athletic performance through a combination of resistance and plyometric exercises.

Phase I (Weeks I–II) focused on establishing foundational strength and proper lifting technique. Each session began with a **10-minute warm-up**, followed by strength and power exercises including *back squats, bench press, deadlifts, standing broad jumps, box jumps,* and *clap push-ups*. Each

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exercise was performed for **2 sets** of **10–12 repetitions**, with **30 seconds rest between sets** and **1 minute rest between exercises**, maintaining a total session duration of approximately **60 minutes**. This phase emphasized neuromuscular activation and the development of basic power output.

Phase II (Weeks III–IV) increased the training volume and intensity to further stimulate muscle adaptation and coordination between strength and explosive movements. Participants performed the same exercises as in the initial phase—*back squats, bench press, deadlifts, standing broad jumps, box jumps,* and *clap push-ups*—but the workload was increased to **3 sets** while maintaining the same repetition range and rest intervals. This progression enhanced muscular endurance and the transfer of strength gains into dynamic, sport-specific power.

Phase III (Weeks V–VI) introduced greater resistance and complexity by incorporating *front squats* in place of back squats, while retaining *bench press, deadlifts, box jumps, standing broad jumps,* and *clap push-ups.* The number of sets was increased to **4 per exercise**, with **10–12 repetitions** each. The rest intervals remained consistent, promoting continuous overload while improving muscular coordination and reactive strength. This phase emphasized advanced strength and explosive performance through a higher training volume.

Phase IV (Weeks VII–VIII) represented the peak training phase designed to maximize strength and power output. The exercises—*bench press, deadlift, front squat, box jump, standing broad jump,* and *clap push-up*—were executed for **4 sets of 12–15 repetitions** with **30 seconds rest between sets** and **1 minute between exercises.** The intensity and volume reached their highest point, promoting optimal neuromuscular efficiency and muscular endurance.

3.3 Statistical Technique

As the purpose of the study was find out the impacts of complex training on selected fitness parameters among football players. at college level, the collected data prior to treatment and after of treatment period were tested using statistically dependent 't' test. It was considered as appropriate for this study.

4.RESULTS

Table 1: Computation of 't' ratio between pre and post-test means of Experimental group on Selected Fitness Parameters

Experimental Group					
Performance Variables	**Pre/Post test**	**Mean**	**Std. Deviation**	**Std Error Mean**	**'t' Ratio**
Speed	Pre-Test	5.97	0.40	1.00	**97.55***
	Post-Test	4.97	0.41		
Leg Explosive Power	Pre-Test	2.08	0.26	0.89	**12.50***
	Post-Test	2.97	0.28		
Leg Strength	Pre-Test	47.44	1.49	3.98	**23.19***
	Post-Test	51.42	1.13		

*Significant at 0.05 level of confidence (2.145), 1 & 14.

Table 1 reveals that the Computation of 't' ratio between pre and post-test means of experimental group on selected fitness parameters. The 't' ratio on speed, leg explosive power and leg strength are 97.55 ,12.50 and 23.19 respectively. The required table value was 2.14 for the degrees of freedom 14 at 0.05 level of significance. Since the obtained 't' ratio values were greater than the table value, it was found statistically significant.

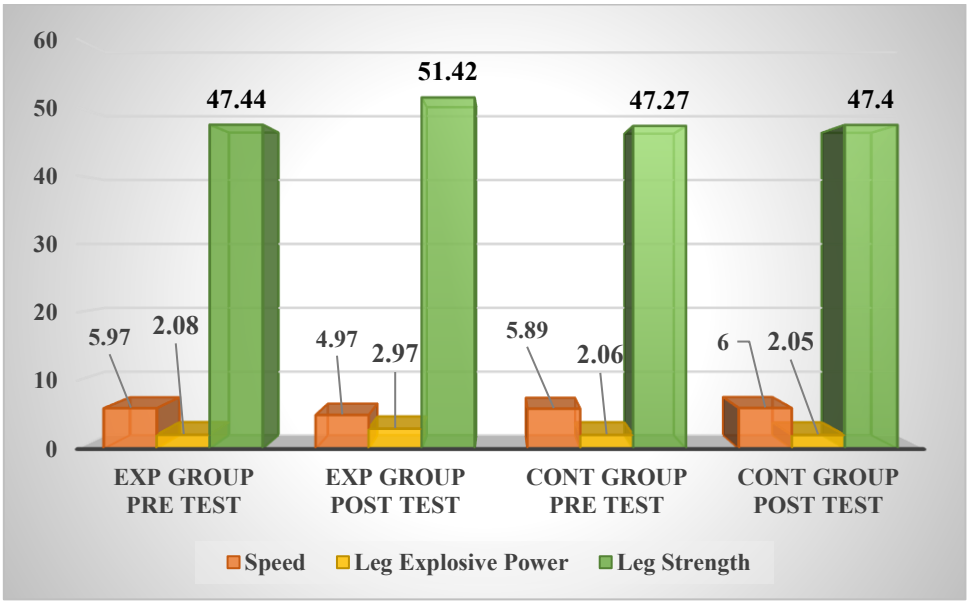
Table 2: Computation of 't' ratio between pre and post-test means of Control group on Selected Fitness Parameters

Control Group					
Performance Variables	**Pre/Post test**	**Mean**	**Std. Deviation**	**Std Error Mean**	**'t' Ratio**
Speed	Pre-Test	5.89	0.35	5.89	0.35
	Post-Test	6.00	0.46		
Leg Explosive Power	Pre-Test	2.06	0.25	0.01	1.41
	Post-Test	2.05	0.22		
Leg Strength	Pre-Test	47.27	1.47	0.13	0.14
	Post-Test	47.40	1.37		

*Significant at 0.05 level of confidence (2.145), 1 & 14.

Table 2 reveals that the Computation of 't' ratio between pre and post-test means of Control group on selected fitness parameters. The 't' ratio on speed, leg explosive power and leg strength are 0.35, 1.41 and 0.14 respectively. The required table value was 2.14 for the degrees of freedom 14 at 0.05 level of significance. Since the obtained 't' ratio values were lower than the table value, it was found statistically not significant.

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4.1 Discussion on Findings

The results of the study indicated that the selected fitness parameters like speed, leg explosive power and leg strength were improved significantly after undergoing complex training. The changes in the selected fitness parameters were attributed the proper planning, preparation and execution of the training package given to the players. complex training on selected fitness parameters of men football players at college level, it was tested under, to differentiate between complex training group and control group.

The complex training includes on combination of resistance followed by plyometric training. It also improves the dribbling ability, game tactics, anaerobic capacity, quickness, eye hand coordination and other than some physical fitness components are namely speed, agility, and power. The obtained result proved positively the strength training and specific skill training group significantly improved. The result of the present study showed that the complex training has significant improvement on college level men football players. The following studies was revealed that **Fernández (2024)** reviewed complex training (CT) in basketball, showing that CT combining heavy-resistance and plyometric exercises improves strength, jumping ability, sprinting, and core strength through both acute post-activation potentiation and chronic adaptations. **Mattapalli Sathish (2021)** assessed the impact of six weeks of complex training on motor fitness and playing ability among 60 school-level Kabaddi players (ages 12–17). Agility, muscular endurance, and overall playing ability improved significantly post-training. **Nandakumar and Ramesh (2020)** explored complex training effects on strength, endurance, and agility among 30 male football players (18–25 years). The experimental group trained three times per week at 60–80% load for several weeks, showing significant improvements compared to controls. **Chitra (2018)** studied 30 intercollegiate women players, examining anxiety and resting pulse rate after eight weeks of complex training. Results indicated significant increases in both measures compared to a control group. The result of the study supports the result of the present study. These finding had not been previously replicated for a sample of college students. The result of the study showed that the control group was not significantly improved.

4.2 Discussion on Hypotheses

1. In first hypothesis, it was hypothesized that there would be significant improvement on selected fitness parameters of college level men football players due to complex training. The result of study indicates that performance variables improved significantly to complex training. Hence, the first hypothesis of the investigator was accepted.
2. In second hypothesis, it was hypothesized that in enhanced the selected fitness parameters of players pertains due to complex training. The results of study indicate that complex training would perform better than the players practicing traditional play. Hence, the second hypothesis of the investigator was accepted.

5.CONCLUSION

Based on the findings and within the limitation of the study, it is noticed that practice of complex training helped to improve speed, leg explosive power and leg strength of college level men football players. It was also seen that there is progressive improvement in the selected criterion variables of complex training group of college level men football players after eight weeks. Further, it also helps to improve speed, leg explosive power and leg strength

1. It was concluded that individualized complex training group showed a statistically significant positive sign over the course of the treatment period on selected fitness parameters of college level men football players.
2. It was concluded that individualized effect of control group showed a statistically insignificant over the course of the period on selected fitness parameters of college level men football players.
3. The results of comparative effects lead to conclude that the complex training group had better significant improvement on selected fitness parameters (speed, leg explosive power and leg strength) of college level men

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football players as compared to their performance with control group.

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