Effect of Complex Training on Selected Physical Fitness Variables among College Men Students

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ABSTRACT

Sports have a big influence on every human life, either directly or indirectly. Modern lifestyle choices have an impact on the general health of society. Through exercise, athletes can safely and successfully maximize their genetic potential. Introducing the team to a performance rating system is one of the main purposes of athlete training. A person who is physically healthy may carry out his daily tasks with enthusiasm and confidence, free from fatigue and fear. Plyometrics and high-intensity resistance training are combined to create complex training. One of the most sophisticated types of sports training, complex training incorporates plyometrics, strength training, and movement specialized to a given sport. Both the neural system and fast-twitch muscle fibers are concurrently activated and worked during complex training. The fast twitch muscle fibers are activated by the strength training. It works well for preparing the body for physically demanding activities. This increases both strength and endurance. It may be possible to simultaneously benefit multiple muscle groups by combining different forms of training into one. As a result, the muscles require more nourishment. This study's goal was to assess how sophisticated training affected a few physical fitness metrics in male college students. Thirty male students, ages 21 to 25, from Alagappa University College of Physical Education in Karaikudi, took part in the study. The participants were split into two equal groups at random: the Complex Training Group (n = 15) and the Control Group (n = 15). Strength and speed, as determined by the 1-RM leg press and 60-meter dash, respectively, were among the chosen fitness variables. While the control group continued their usual routine without any specific training, the experimental group participated in a 12-week sophisticated training program. The t-test was used to examine the data from the pre-test and post-test at a significance level of 0.05. The results showed that while the control group exhibited no discernible changes, the sophisticated training group showed notable gains in strength and speed. These findings demonstrate how well sophisticated training can improve physical fitness.

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1. INTRODUCTION

In recent decades, sports have gained a lot of popularity around the world. There is a noticeable increase in sports fissionability, and perhaps this trend will continue.

It is impossible to overestimate the positive social and creative effects of sports. Perhaps mortal society as a whole cannot benefit much from athletics. The whole development of the human character is facilitated by sports [1]. Give us some examples of healthy relaxation techniques that are beneficial to both the body and the mind.

Fitness is defined as possessing the necessary attributes or as being ready or prepared [2]. These seem to suggest that wellness is a strategy for anything or that it possesses the necessary components for something.

As previously said, moderate physical activity significantly improves health and wellness, increasing your fitness level Through Exercise especially for those who are currently inactive and begin engaging in moderate physical activity [3].

However, by increasing the amount of time and intensity of physical activity, people can reap even more health and wellbeing benefits. They will have more decreases in the risk of disease and mortality as well as more increases in their quality of life with increased activity [4].

Moderate physical activity is insufficient to increase physical fitness; more intense activity, such as that found in a planned, methodical training program, is also required.

More intense movement that presents a significantly higher physical challenge is necessary for physical fitness, which is a condition of health and well-being and, more precisely, the capacity to carry out daily tasks, sports, and jobs. The three main components of physical fitness are adequate rest, moderate-to-intense exercise, and a healthy diet [5].

Both general health and athletic performance are significantly impacted by physical fitness. Complex training has become well-known among training approaches for its effective development of strength and speed.

The phrase "physical fitness" is complicated and encompasses many aspects of health and wellbeing. Fitness protects against a wide range of illnesses. It improves its ability to fight off infections and other diseases by fortifying its immune system.

Regular exercise can help prevent several of the most prevalent types of cardiovascular disease. Above all, exercise slows down the aging process. A healthy body and mind work best together. One strategy to guard against mental disease is to keep your body and mind in good condition. Those who look after their bodies are happier than those who don't. A healthy lifestyle combined with physical fitness can significantly improve one's quality of life [6].

In addition to increasing your energy levels and burning calories, exercise also decreases blood triglycerides. An increase in blood flow benefits every organ in the body,

which improves general health. Because exercise increases lung capacity, it makes breathing easier. It helps to give the blood oxygen.

In order to optimize muscle power and neuromuscular responses, complex training combines plyometric movements with resistance workouts. Athletes can take advantage of the post-activation potentiation (PAP) effect, which occurs when strength training intensifies subsequent explosive actions, thanks to this combination. The essential elements of athletic performance are strength and quickness [7].

While speed training increases neuromuscular coordination and reaction time, strength training increases muscle force generation. Both are carefully combined in complex training, which produces more physiological adaptations than conventional training techniques.

A key component of complex training, sometimes referred to as contrast training or post-activation potentiation training, is strength training. A power-based program requires both plyometrics and strength training, even though each may improve athletic performance in its own right.

Because strength training has kept the muscles highly engaged, they have developed a greater capacity to transmit force than they otherwise would have. This increased ability for exertion is known as post-activation potentiation (PAP). It serves as the foundation for more sophisticated training techniques [8].

The athlete uses the force-application potential they developed during the strength training to do the plyometric activity, which allows them to produce more power than they would have if they had only done plyometrics.

With this type of workout, power production in jumping, running, and throwing a ball increases either immediately or gradually. It is possible for an athlete to condition their nervous system and muscle fibers to operate at the same level as their fast-twitch counterparts by using complex training [9].

Complex training can be in many different ways. The majority of routines start with an isometric or slower tempo resistance exercise designed to prepare the muscles and nervous system for the much faster tempo activity that follows.

Depending on the specifics, the second exercise can be a plyometric or ballistic workout. It seeks to optimize neuronal activation and muscle fiber recruitment by amplifying the PAP effect of the first workout.

The leading experts in the field have demonstrated that exercise changes the size and force-generating potential of muscle fibers. The ability of a muscle to explode after a maximum or near-maximal contraction is increased by complex training.

Training takes place in this improved state. It has been proposed that athletes might gain from further altering their training regimen.

Power and strength work together to produce speed. The thighs contract powerfully with each stride. Squats and other exercises that work both the quadriceps and the hamstrings are great options in the weight room.

When performing squats, hops, and, of course, sprints, all of the leg muscles work together to produce intense contractions. Strengthening the runner causes more muscle fibers to contract with each stride, increasing the forward push and, thus, the thrust.

Compared to beginners or experts, seasoned athletes are more vulnerable to the negative consequences of training complexity. More so than with shorter training programs, strength can be acquired with more complex ones. This may improve your vertical leap and the power and flexibility of your upper and lower body muscle fibers in comparison to plyometric exercise [10].

Academic achievement may be a helpful metric for assessing learning in a university setting. Numerous elements have been emphasized in this context as significant predictors of academic achievement.

First of all, it is believed that physical activity is a crucial component that could significantly affect academic achievement because prior studies have shown improvements in a variety of cognitive abilities, including execution, decision-making, perception, focus, and memory, all of which would be facilitated by regular activity practice.

Additionally, earlier studies discovered a favorable relationship between increased academic achievement and rigorous physical activity. Second, stress has been identified as a significant factor that may negatively affect academic achievement.

According to earlier studies, acute stress caused the prefrontal cortex's blood flow to decrease, which in turn caused the area's oxygen and nutrition levels to drop. This resulted in problems focusing, memory loss, and increased decision-making.

Enhancing different aspects of physical fitness or motor skills is the main goal of sports training since an athlete's performance in sports is typically based on their level of physical fitness.

Every sport requires a certain level of physical fitness, but since specific fitness depends on general fitness, it is important to consider how to develop physical fitness.

A sportsperson's performance capacity, which is complex and dependent on a variety of factors like speed, strength, flexibility, endurance, and coordination, determines an individual's performance.

The usefulness of sophisticated training in enhancing college male students' strength and speed is investigated in this study. This study attempts to determine whether complex training can significantly improve physical fitness by combining plyometric activities and progressive resistance training.

2. LITERATURE REVIEW

Redondo-Flórez et al. [11] examine the relationship between university students' academic performance and their body composition, cardiovascular health, sleep patterns, and physical activity levels. The study included 261 students with bachelor's degrees in

sports science and physical activity. Based on their academic achievement, the participants were split into two groups: the high academic performance group (HAPG) and the low academic performance group (LAPG). Blood pressure, physical activity, sleep patterns, and body composition were all assessed, and the Cooper's 12-minute run test was used to estimate maximum oxygen uptake. According to the findings, students who performed well academically had lower diastolic blood pressure, a higher VO2 max than the LAPG, and insomnia brought on by respiratory issues. As a result, we discovered a significant correlation between academic achievement and VO2 max, diastolic blood pressure, and breathing-related sleeplessness. These findings emphasize how crucial it is to implement various programs that could enhance these elements, particularly those pertaining to exercise and sleeping patterns, in order to raise academic performance.

Shang et al. [12] investigates the association between exercise and subjective well-being through the mediation of self-esteem and body image, offering some recommendations for enhancing college students' subjective well-being. The poll was voluntarily completed by 671 college students from three Sichuan, China-based universities of science and engineering. SPSS statistics was used to perform descriptive statistics, Pearson's product-moment correlation, and mediation model analysis. According to the findings, (1) there was a positive and significant correlation between the degree of physical activity and each dimension's subjective well-being. (2) Compared to college students who exercise at low levels, those who exercise at medium and high levels report increased subjective well-being, and (3) the relationship between physical exercise and subjective well-being was fully mediated by body image and self-esteem. Two pathways were identified by the mediation analysis: the first was the sole mediating path through self-esteem. Secondly, the serial mediating channel through self-esteem and body image.

Versic et al. [13] analyze the effects of three weekly sessions of RT and ET on blood pressure (BP), muscular fitness, and anthropometric/body composition indices in young women who appeared to be in good health and who took part in a program of their own choosing over the course of eight weeks. 57 young, healthy women who were split into three groups—exercising, RT, and non-exercising—made up the sample of participants. The variables included cardiovascular parameters (systolic and diastolic blood pressure, resting heart rate), muscular fitness variables (upper and lower body strength, abdominal strength, dynamometric force, and flexibility), and anthropometric/body composition indices (body mass, BMI, body fat, and lean body mass).

The study employed a pre- and post-testing strategy that included a consecutive post hoc test and factorial analysis of variance for repeated measurements (ANOVA: Group × Measurement). With no discernible changes in the C group, the ANOVA showed that both exercise groups improved in body composition (lean body mass increased and body fat percentage decreased), resting heart rate, and flexibility in a comparable manner. Compared to ET, RT increased the participants' strength and force capacity more. Although there were no statistically significant pre- to post-changes, blood pressure did reveal a tendency of improvement in both training groups. The results of correlation analysis using pre- to post-differences (VD) variables showed weak relationships between VDs, suggesting that the effects obtained for the various variables in each training group

were comparatively independent. Numerous positive changes demonstrated the effectiveness of both regimens in a comparatively short amount of time, despite the fact that the young women in this study appeared to be in good condition. Even though the study's participants chose their own training regimens, this fact may have some bearing on the benefits that have been shown.

Xu et al. [14] analyze how physical activity affects resilience and how competence, autonomy, and relatedness needs mediate the relationship between resilience and physical activity. 2375 college students, with an average age of 20.25 years (SD = 2.04), participated in the study (1110 men and 1265 females). The International Physical Activity Questionnaire Short Form, the Basic Needs Satisfaction in General Scale, and the Connor-Davidson Resilience Scale were completed by the participants. The findings indicated that resilience and physical activity were positively correlated, and that the three fundamental needs significantly mediated the relationship between resilience and physical activity. Competence need had a far stronger indirect impact than relatedness and autonomy needs. In summary, college students who engage in physical exercise are more resilient, and the association between physical activity and resilience is mediated by the satisfying of competence, autonomy, and relatedness requirements, with competence need emerging as the most potent mediator.

Durai [15] analyze how fartlek and complicated training affect speed in physical education students Using a true random group design with a pre-test and post-test. The subjects (N=45) were randomly assigned to three equal groups of 15 physical education students. The groups were designed as fartlek training group -1, complex training group-2 and control group- 3 respectively. Pre- test was conducted for all the 45 subjects on speed. For six weeks, the experimental groups engaged in their corresponding training. None of the training sessions were attended by the control group. The 50-meter dash was used to measure speed. The training session was planned for three days a week (Monday, Wednesday, and Friday) from 6 to 7.30 am. The Analysis of covariance (ANCOVA) was used to test the treatment effect. When the adjusted post-test was significant, the Scheffe's post-hoc test was used to find out the paired mean differences. It was observed that fartlek training has showed better in speed.

3. MATERIALS AND METHODS

3.1. Participants and Study Design

Thirty male college students, ages 21 to 25, from Alagappa University College of Physical Education, were split into two groups at random:

- 15 members of the experimental group took part in a challenging 12-week training course.
- Control Group (n=15): Performed their usual physical exercises without receiving any particular instruction.

Training Protocol

Three times a week (Monday, Wednesday, and Friday), the experimental group trained using a progressive resistance and plyometric regimen. Plyometric activities (such as medicine ball throws, squat leaps, and bounding) were performed after compound resistance exercises (such as squats, leg presses, and bench presses) in each session. Every four weeks, the level of training intensity was gradually increased. The control group did not participate in any more formal training; they carried on with their regular activities.

Testing Procedures

Prior to and following training, the following fitness factors were evaluated:

- Strength: Measured in kilograms using the 1-RM leg press.
- Speed: The 60-meter dash is used to measure speed in seconds.

Pre-test and post-test scores were compared statistically using the t-test at a 0.05 significance level.

4. RESULTS AND DISCUSSION

Table 1. Analysis of 't'-Ratio for Strength (1-RM Leg Press)

Group	Pre-Test Mean	Post-Test Mean	Mean Difference	t-Value	Significance
Experimental	1.7353	1.8587	0.1233	8.16*	p<0.05
Control	1.7333	1.7320	0.0013	0.086	NS

*Significant at 0.05 level; NS = Not Significant

Table 2. Analysis of 't'-Ratio for Speed (60-Meter Dash)

Group	Pre-Test Mean	Post-Test Mean	Mean Difference	t-Value	Significance
Experimental	7.634	7.174	0.46	8.55*	p<0.05
Control	7.640	7.55	0.09	0.942	NS

*Significant at 0.05 level; NS = Not Significant

Discussion and Findings:

The results show that the experimental group's strength and speed were considerably increased by complicated training. The combination of resistance training and plyometric activities, which maximize neuromuscular activation, is responsible for strength improvements. The post-activation potentiation (PAP) effect, in which pre-activation through strength training boosts subsequent explosive movements, is probably what caused the speed increases. Table 1 and 2 shows the analysis of 't'-Ratio for strength and speed.

The lack of notable improvements in the control group supports the efficacy of organized training treatments. The findings of the control group did not alter, but the

experimental group's gains were statistically significant ($p<0.05$), according to the analysis. These findings are consistent with earlier studies that found complicated training to be very beneficial for building muscle strength and speed (Ebben, 2002). To optimize performance improvements, coaches and athletes should think about adding complicated training to their conditioning regimens.

5. CONCLUSION

According to the study's findings, a 12-week rigorous training program considerably improves college male students' strength and speed. Plyometric drills and resistance training have been shown to be a successful combination for enhancing neuromuscular efficiency and sports performance. Future studies should examine long-term adaptations and how complicated training affects other aspects of fitness including endurance and agility.

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