



Original Article

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Speed, Strength, and Explosive Power: Effect of Circuit Training and Weight Training on Sprinters of Hyderabad District

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ABSTRACT

The study was undertaken to determine the sequel of two training methods, i.e., Weight and Circuit training on specified physical components for Sprinters of Hyderabad. Forty-five inter-collegiate Male Sprinters aged 18 to 22 years were taken as subjects and divided into weight training group– G-I (n=15), circuit training group – G-II (n=15), and control group G- III (n=15). Both experimental Groups were given specific training, and G-III, which represented control, was not given any workout apart from their normal activities. The training protocol was for 12 weeks, 3 days per week for twelve weeks, and 50 minutes /session. The picked-up Physical components were abdominal force, alacrity, and explosive power. Sit-up, speed run of 50 M, and Standing Broad Jump were the trails used for the start and end of the program. The results of the study indicated an F ratio of 3.935, 3.034, and 6.766 for sit-ups, standing, broad jump, and 50 dash, respectively, which were significant at a 0.05 confidence level. It was deduced that there was a noteworthy difference in performance in the circuit training and weight training groups when compared with the control group in all physical variables.

Key words: Sprinters, Weight training, Circuit training, Physical variables

INTRODUCTION

A new training method termed Circuit Training was first invented by Scientists Morgan and Adamson at Leeds University in 1957 [1]. This is resistance for developing motor adeptness like power, velocity, and stamina. The above training protocol encompasses a set selected exercise "circuit" which comprises work out for the upper part of the body, the lower side of the back, the abdomen, and the Lower part of the body [2]. This type of training can be executed with our own body weight and by means of resistance drills like Barbells, Medicine Balls, etc [3]. Circuit training enhances all-around physical condition, as against the fitness needed for a particular sport [4]. Circuit training is a form of training that comprises several exercises that target different muscle groups with a little rest in between. It's perfect for those looking for a swift, effective, full-body workout [5]. Normally, circuit training revolves around 8–10 exercises, but the schedule is fixed on the basis of the target of a group, the availability of time, and the playing levels of the subjects. In the circuit protocol, there is a rest period of 1-2 minutes after all the selected exercises are finished. Thereafter, the routine of exercise is done again and completed 1-3 times [6]. The protocol of each circuit training differs and may not be identical to each other [7]. Besides, the selection of exercises varies considerably and is based on an individual's performance, health targets, experience, mobility, and many other reasons [8]. To quote an example, circuit training can be planned to improve speed and alertness in professional football players or to improve the cardiovascular condition of novice players. Almost all the circuit trainings are either scheduled by time or by the number of repetitions. If it is performed with time, the exercise is done for 30–60 seconds, but if it is done by repetitions, then usually it is up to 20, and then an individual

changes to the next how circuit training affects the chosen Physical Fitness components among Inter-Collegiate Handball Men players [9]. He gave handball training to two training groups apart from administrating circuiting training to one group thrice a week for 6 weeks. He collected the pre and post-test data and used ANOVA to analyze the significant difference between groups. He concluded that the investigational group notably enhanced the chosen physical fitness variables of speed, agility, and explosive power owing to 6 weeks of circuit training. Resistance, or in other words, training with weights, demonstrates a key phase of performance and health-oriented exercise regime [10]. It is considered a widespread kind of strength training for increasing the size of muscles. Resistance training involves the performance of physical movements that are intended to advance strength and endurance. It utilizes the force of gravity in the shape of weighted bars, dumbbells, or weight sets to combat the force induced by muscle in the course of concentric or eccentric movements. It is often linked with the utilization of weights. Weight training adapts a range of exclusive modalities to aim at the development of precise muscle groups and types of movement. It can also amalgamate diversified training approaches such as calisthenics, isometrics, and plyometrics [11]. Almost all sports disciplines, such as throwing events in athletics, weightlifting, powerlifting, and bodybuilding, require enormous strength. Numerous other sports entail resistance training as a component of their training since it can offer noteworthy functional rewards and boost comprehensive health when accurately performed. Apart from that, sports like American football, judo, taekwondo, wrestling, volleyball, basketball, swimming, athletics, etc., depend on weight training to increase muscle strength, power, endurance, and hypertrophy, which results in improved motor performance [12]. Among a few listed potential health benefits are diminished body fat, augmented basal metabolic rate, reduced blood pressure, cardiovascular demands to exercise, superior blood lipid profiles, glucose tolerance, insulin sensitivity, improved muscle connective tissue, cross-sectional area, superior functional capacity, apart from relieving low back pain [13].

Kumar and Zemková (2022), in their study on the benefit of 12-week core strengthening and resistance training on the strength of the muscles of athletes in school, found a significant increase in the strength of the young athletes [10]. Schoenfeld (2019) conducted a study on how hypertrophy of a muscle is increased with resistance training [14]. He differentiated 3 main factors for gaining hypertrophy: 1. Mechanical tension 2. Metabolic stress and muscle damage. All these factors lead to an increase in the strength of the muscle. A similar study was undertaken by Ikezoe *et al.* (2017); Schoenfeld *et al.* (2017) highlighted the importance of performing resistance exercises to maximize muscle hypertrophy [15, 16].

Hence, an effort is made through this investigation to discern how circuit training and weight training can cause a change in the speed, strength, and explosive power of male sprinters of the Hyderabad district.

MATERIALS AND METHODS

To accomplish this goal, 45 inter-college male sprinters aged 18 to 22 years were taken as subjects. They were randomly selected from the participants of the inter-college tournament. The subjects picked up were split into weight training group– G-I (n=15), Circuit Training group – G-II (n=15), and control group – G-III (n=15). Both experimental Groups were given specific training, and the G-III control group was not given any workout apart from their normal activities. The training protocol was for 12 weeks, 3 times a week, and 50 minutes /session. The study components were abdominal strength, speed, and explosive power, which were judged prior to and at the conclusion of the training plan.

The G-III group underwent the following training:

For the upper-body -Press-ups, Inclined press-ups

For the Core & trunk- Sit-ups (lower abdominals), Back extension

Lower-body- Bench squat, Step-ups

Total-body-Squat thrusts, Burpees

The weight training groups were given five exercises as follows:

Bench press, deadlift, squat, shoulder press, and pull-up.

Tools

The Tests that were used for the examination at the start and end of the program for measuring the Physical variables are noted below:

Sit Ups – Abdominal Muscular Strength

Standing Broad Jump – Explosive Power of Legs

50 M Run – Acceleration and Speed.

The statistical tools used for the analysis of the data were ANOVA with Means \pm SD and 'f' ratio. For knowing the significance, the level was fixed at 0.05.

RESULTS AND DISCUSSION

Table 1. ANOVA with Means \pm S. D and 'f' ratio for Sit Ups, Standing Broad Jump, and 50 Meter Run for Training, groups, and control group

Variable	Group	Control Group	Group Weight Training	Circuit Training Group	'F' Ratio
Sit Ups (in Numbers)	Pre-test Mean \pm S. D	37.13 \pm 1.15	37.2 \pm 1.25	37.3 \pm 1.21	0.001
	Post-test Mean \pm S.D.	37.34 \pm 1.16	39.16 \pm 1.31	41.22 \pm 1.36	3.935*
Standing Broad Jump (in Meters)	Pre-test Mean \pm S. D	1.916 \pm 0.12	1.918 \pm 0.135	1.922 \pm 0.13	.003
	Post-test Mean \pm S.D.	1.919 \pm 0.12	2.066 \pm 0.22	2.140 \pm 0.31	3.034*
50 M Run (in Seconds)	Pre-test Mean \pm S. D	6.90 \pm 0.008	6.89 \pm 0.0089	6.90 \pm 0.0083	.006
	Post-test Mean \pm S.D.	6.88 \pm 0.0081	6.59 \pm 0.0092	6.48 \pm 0.0097	6.766*

* level of confidence at .05.

Table 1 shows the values of the 3 groups. The Mean and S.D. for sit-ups were 37.3 \pm 1.21, 37.2 \pm 1.25, and 37.13 \pm 1.15 for G-II circuit training, G-I weight training, and G-III control group, respectively, for Pre-Test, The F ratio was 0.001, which was not significant. In the post-test, the readings were 41.22 \pm 1.36, 39.16 \pm 1.31 & 37.34 \pm 1.16 for the G-II circuit training, G-I weight training, and G-III control group, respectively, with F ratios of 3.935, which was significant at 0.05 level of confidence. The Mean \pm S. D for standing broad jump were 1.922 \pm 0.13, 1.918 \pm 0.135 & 1.916 \pm 0.12 for the G-II circuit training, G-I weight training, and G-III control group, respectively for the Pre-Test, The F ratio was 0.003, which was not significant. In the post-test, the readings were 2.140 \pm 0.31, 2.066 \pm 0.22 & 1.919 \pm 0.12 for the G-II circuit training, G-I weight training, and G-III control group, respectively, with an F ratio of 3.034 which was significant at 0.05 level of confidence. The Mean and SD for 50 M dash were 6.90 \pm 0.0083, 6.89 \pm 0.0089 & 6.90 \pm 0.008 for G-II circuit training, G-I weight training, and G-III control group, respectively, for the Pre-Test. The F ratio was 0.006, which was not significant. In the post-test, the readings were 6.48 \pm 0.0097, 6.59 \pm 0.0092 & 6.88 \pm 0.0081 for the G-II circuit training, G-I weight training, and G-III control group, respectively, with an F ratio of 6.766 which was significant at 0.05 level of confidence.

There are numerous research studies in physical activity and exercise in the literature which concluded that an increase in strength along with cardio fitness and development of body composition will result in overall health benefits in the people, including improving quality of life in sick people with various diseases. It is a foregone conclusion that the best common concurrent training method is resistance circuit-based training, which develops aerobic conditioning, muscle endurance, neuromuscular and strength adaption [17].

Fitness experts have advised circuit training for untrained individuals with lower levels of fitness. They are of the opinion that Circuit training results in higher heart rate along with higher oxygen consumption in athletes. It was also found that there was greater excess post-exercise oxygen consumption with circuit training than compared to traditional weight training sessions. Many earlier studies have concluded that circuit training had a profound improvement in VO₂ Max, endurance performance, body composition, and strength performance [9, 18-23]. The results of our study corroborate with the above research studies, confirming that circuit training helps in the development of strength, speed, and explosive power. Some of the researchers who had forayed to find out the effects of circuit training did not find improvements in maximum strength, muscle growth, aerobic performance, VO₂ Max, and decrease in body fat [4, 17]. Our study opposes the results of the above researchers.

Weight training or training with resistance is a variety of strength training that utilizes weights for resistance that provides stress to the muscles, thereby making them adapt and become stronger. Weight training sessions a couple of times per week are advised to focus on significant improvements in strength. Lean body mass tends to reduce with age, and if care is not taken to replace it, then it will be replaced by fat. Weight training is the only answer to such a situation where it can reverse the trend in age and stop muscle loss, making it stronger and healthier. There are many studies with weight training protocols that found increases in strength, explosive power, and speed

[14, 24-27]. The results of these studies are in line with the findings of our study, thereby confirming that resistance training improves strength, speed, and explosive power.

One important observation of this study was that circuit training had a more beneficial effect on the improvement of the study variables than weight training. There may be various reasons for such an outcome, and one among them may be that Circuit training follows a strict regime of exercise with little rest period.

CONCLUSION

It was established that the protocol of circuit workout and weight training significantly improved speed, explosive power, and strength. It was further concluded that circuit training is more effective in bringing changes in the study variables than weight training.

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