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A STUDY OF THE EFFECT OF CIRCUIT AND PLYOMETRIC TRAINING ON FLEXIBILITY IN STUDENTS

*Dr. Rekhaben H. Kachadiya

Assistant Professor, M. M. Ghodasara Mahila Arts and Commerce College, Junagadh.

Abstract:

The purpose of this research study was to study the effect of Circuit and Plyometric training on the flexibility of students. In this research study, students of M. M. Ghodasara Mahila Arts and Commerce College, Junagadh, aged 18 to 25 years, were randomly selected and stratified into 3 groups. In this research study, they were divided into three groups: Group-A Circuit (30), Group-B Plyometric (30) and Group-C Control (30). A total of 90 subjects were randomly selected in this research study. The standard of measurement for flexibility was the Sit and Reach Test. In this research study, subjects were randomly selected. 30 subjects were placed in each group. A pre-test of speed was conducted on each group. Then group-A was given Circuit training and group-B was given Plyometric training for 08 weeks and group-C was kept as the control group. After that, the post-test of all three groups was taken. To know the effects of Circuit and Plyometric training on the group, one-way analysis of covariance test was applied and the differences between the means were tested for significance at the 0.05 level by Least Significant Difference Post Hoc test. The conclusion was as follows. A significant improvement was observed in the flexibility of the subjects selected from the 08-week Circuit training and Plyometric training program of the method.

Introduction :

Circuit training is a form of physical conditioning that combines strength and cardiovascular exercises performed in a sequence with minimal rest between stations. This method aims to improve muscular endurance, strength, and aerobic fitness simultaneously. Developed by R.E. Morgan and G.T. Anderson in 1953 at the University of Leeds in England, circuit training has become one of the most effective and time-efficient training systems used in sports, fitness centers, and rehabilitation programs.

A circuit typically consists of 6 to 12 exercise stations arranged to target different muscle groups, ensuring a balanced workout. Each station may involve activities such as push-ups, squats, jumping jacks, burpees, or resistance exercises. Participants perform each exercise for a set time or repetitions before moving to the next station. The combination of aerobic and anaerobic exercises enhances both cardiovascular endurance and muscular strength, making circuit training a holistic approach to fitness.

Furthermore, circuit training allows for flexibility in design—it can be adapted for beginners or advanced athletes by adjusting intensity, duration, and rest intervals. It promotes calorie expenditure, improves metabolic rate, and increases functional fitness. Because of its variety and dynamic structure, it also maintains participant motivation and engagement.

In modern physical education and sports science, circuit training is widely recognized as a versatile and efficient training technique that contributes to overall physical development, injury prevention, and sports performance enhancement.

Plyometric training is a specialized form of exercise designed to enhance explosive power, speed, and neuromuscular coordination. It involves rapid stretching (eccentric phase) followed by a quick shortening (concentric phase) of the muscles, known as the stretch-shortening cycle. This technique helps

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develop the ability to exert maximal force in the shortest possible time, making it highly effective for athletes in sports that require jumping, sprinting, and sudden directional changes.

Originating in the 1960s from Soviet sports science, plyometric training was first termed “jump training” or “shock method” by Dr. Yuri Verkhoshansky, who used it to improve the explosive capabilities of track and field athletes. The method quickly spread to Western countries and became a standard component of modern athletic conditioning.

Exercises commonly used in plyometric training include jump squats, bounding, box jumps, clap push-ups, and medicine ball throws. These activities stimulate both the nervous system and the musculoskeletal system, increasing muscle fiber recruitment and improving muscular elasticity. Regular plyometric practice enhances vertical jump height, sprint performance, and overall agility.

Moreover, plyometric training is adaptable for athletes of different skill levels and can be integrated with strength and endurance training for comprehensive performance development. When performed with proper technique and progressive intensity, it not only boosts performance but also reduces the risk of injuries by strengthening tendons and ligaments.

Flexibility is a vital component of physical fitness that refers to the ability of a joint or series of joints to move freely through their complete range of motion. It plays a crucial role in efficient movement, athletic performance, and injury prevention. Flexibility depends on several factors, including muscle length, joint structure, connective tissue elasticity, and nervous system regulation. Regular flexibility training helps improve posture, coordination, and balance, making it essential for both athletes and the general population.

There are two primary types of flexibility: static flexibility, which involves holding a stretch for a certain period, and dynamic flexibility, which involves movement through a full range of motion. Activities such as yoga, stretching, and gymnastics emphasize flexibility development, while dynamic stretching is commonly used by athletes to prepare muscles for explosive actions. Flexibility training enhances the performance of movements in various sports such as gymnastics, swimming, martial arts, and track and field.

Physiologically, flexibility improves muscle efficiency by reducing stiffness and increasing blood flow to muscles and tendons. It also reduces the likelihood of strains, sprains, and muscle soreness following intense physical activity. A well-planned flexibility program should include stretching after warming up and cooling down, ensuring gradual and safe improvement in joint mobility.

The Purpose of the Study :

The purpose of this research study was to study the effects of Circuit and Plyometric training on students' flexibility.

Selection of the Subject :

In this research study, students of M. M. Ghodasara Mahila Arts and Commerce College, Junagadh, aged 18 to 25 years, were randomly selected and stratified into 3 groups. In this research study, they were divided into three groups, namely, Group-A Circuit (30), Group-B Plyometric (30) and Group-C Control (30). A total of 90 subjects were randomly selected in this research study.

Criterion Measurement :

Sl.	Variable	Test	Measurement
1	Flexibility	Sit and Reach Test	Cm.

Design of the Study:

In this research study, subjects were selected randomly. 30 subjects were kept in each group. A pre-test of flexibility was taken on each group. After that, group-A was given Circuit training and group-B was given

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Plyometric training for 08 weeks and group-C was kept as the control group. After that, post-test was taken on all three groups.

Statistical Procedure:

To determine the effects of Circuit and Plyometric training on the group, a one-way analysis of covariance test was applied, and the differences between the means were tested for significance at the 0.05 level using the Least Significant Difference Post Hoc test.

Result of the Study :

Table - 1

Covariance Analysis of Two Experimental and One Control Group of Flexibility Test Performance

Test	Group			Variation covariance analysis				
	Circuit Training	Plyometric Training	Controlled	Sum of square (SS)		Degree freedom *(df)*	Mean sum of square (MSS)	*F*
Per test Mean	5.567	5.433	5.733	A	4.022	2	2.011	0.706
				W	420.600	87	4.834	
Post test Mean	8.868	8.733	7.733	A	56.867	2	28.433	11.319*
				W	386.033	87	4.437	
Adjusted Mean	8.920	8.137	6.735	A	73.844	2	36.922	19.691*
				W	202.507	86	2.355	

*Significance level 'F' = 0.05 (2,87) = 3.101 & (2,86) = 3.103 at 0.05 level

In the above table - 1, the 'F' ratio of the pre-test medians of the flexibility test performance was found to be 0.706. Comparing it with the table value (3.101) it was not found to be significant at the 0.05 level. The 'F' ratio of the final test medians of the three groups was found to be 11.319. Comparing it with the table value (3.101) it was found to be significant at the 0.05 level. Therefore, the training provided proved to have significantly improved the performance of the subjects. In addition, the 'F' ratio of the improved medians was found to be 19.691. Comparing it with the table value (3.103) it was found to be significant at the 0.05 level. The difference between the adjusted means of the three groups is significant by the 'F' ratio. To see the significance of the differences between the adjusted final means and to check which group in the Circuit training group and the Plyometric training group has been more effective in the experimental training, the significance was checked along with the critical difference between the adjusted means. Which is shown in Table – 2.

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Table-2

Table showing the critical difference between the means of two experimental and one control group in speed test performance.

Mean			Mean Different	Critical Different
Circuit Training	Plyometric Training	Controlled		
8.920	8.137		0.783	0.988
8.920		6.735	2.185*	
	8.137	6.735	1.402*	

*Significance level at 0.05 level

In the above table - 2, the Circuit training group showed a significant improvement (2.175) compared to the control group. Then the Plyometric training group showed an improvement (1.492) compared to the control group. The training given to the Circuit training group was more significant in the experimental fitness of the Circuit training group and the Plyometric training group. The significant effect of the experimental fitness was seen in both the experimental groups, the Circuit training group and the Plyometric training group, compared to the control group.

Conclusion :

A significant improvement in the flexibility of the subjects selected from the 8-week Circuit training and Plyometric training program was observed.

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