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Research Paper

THE IMPACT OF AQUATIC AND LAND CIRCUIT TRAINING ON FLEXIBILITY AMONG ATHLETES.

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Abstract

The purpose of the study was to find out the Impact of aquatic and land circuit training programme on flexibility among athletes, to achieve that 45 subjects aged from 14 to 17 years in Kavinadu youth sports club ,Pudukkottai, Tamilnadu, India were randomly selected as subjects, subjects (N = 45) were divided into three equal groups. Namely, Group I underwent circuit training, group II underwent aquatic training for three days per week for six weeks and Group - III acted as control group was not given any specific training. Each group consists of 15 subjects. The following criterion variable was chosen namely flexibility. The adjusted post-test means of flexibility, circuit training group, aquatic training group and control group are 17.38, 17.99 and 13.72 respectively on flexibility the obtained 'F' ratio of 36.64 for adjusted post-test means is more than the table value of 3.22 for df 2 and 41 required for significance at 0.05 level of confidence on flexibility. There was a significant difference exists between circuit training group and control group, aquatic training group and control group on flexibility. And also there was a significant difference exists between aquatic and circuit training group.

Key words: Aquatic training, circuit training, Flexibility

Introduction

Aquatic Fitness offers many options and different forms of training from Lap Swimming to Water Walking. The natural drag of moving an arms or a leg through water can be used to create resistance or facilitate movements. In other words, as an athlete moves an arm or a leg increasingly faster through water, more force is necessary to overcome the viscosity of that water. Another important facet of hydrodynamics is that the greater the surface area of an object moving through water, the more force is needed to move it. Consequently, the concentric and eccentric demands on a muscle can be further challenged by increasing the athlete's surface area using paddles or other aquatic exercise. And while land workouts provide one form of resistance - against the pull of gravity - water workouts provide resistance. That's a tremendous advantage in sports training, trainer Bethany Diamond said, "Athletes strengthen their muscles in exactly the motions they'll need in their sports." The awesome effects of aquatic training are being found each and every day.Arnheim (1987) stated that circuit training is a method of physical conditioning that employed both apparatus resistance training

and calisthenics conditioning exercise. It provides a means of achieving optimal fitness in a systematized controlled fashion. The intensity and vigor of circuit training are indeed challenging and enjoyable to the performer. This system produces positive changes in motor performance, general fitness, muscular power endurance and speed. Circuit training stations are generally sequenced in a way to alternate between muscle groups, which allows for adequate recovery. The rest interval between stations should be between thirty-ninety seconds and one-three minutes between circuits. The load should be increased periodically to ensure progressive over load. In addition, the sequence of exercise should be arranged so that no two consecutive stations consist of exercise involving the same muscle group. Training frequency should be three days per week, with duration of at least 6 weeks**.** (Shaver 1981). Aquatic training significant improvement of Physiological performance (K.Kamalakkannan et.al. 2010). Aquatic training shows significant improvement in all the selected physical fitness variables (K.Kamalakkannan et.al. 2010). Shallow water walking has show greater improvement in physical fitness variables (K.Kamalakkannan et.al. 2014). Plyometiric training in aquatic environment can be effective improvement in endurance (K.Kamalakkannan et.al. 2011).Aquatic training produced positive impacts on the agility and explosive power (K.Kamalakkannan et.al. 2010). Aquatic plyometric training with and without resistance have benefits depending on the type and goal of training (K.Kamalakkannan et.al. 2011). Aquatic training group had no significant changes compared to combined training group in all variables. Also combined training group had no significant changes compared to aquatic training group in all variables (K.Bagavinar & K.Kamalakkannan, 2013). Aquatic training group had no significant reduction than control group in systolic blood pressure and diastolic blood pressure. Also aquatic training group had no significant changes compared to combined training group in all variables (K.Bagavinar & K.Kamalakkannan, 2013).

Methodology

The purpose of the study was to find out the impact of aquatic and land circuit training on flexibility among athlete to achieve this purpose of the study forty five athletes in Kavinadu youth sports club, Pudukkottai, Tamilnadu, India were randomly selected as subjects. The selected subjects were divided in to three equal groups of fifteen subjects each. Group I underwent circuit training, group II underwent aquatic training for three days per week for six weeks. Group III acted as control group that did not participate in any special training programme apart from their regular activities as per their curriculum. Aquatic training and circuit training programme three days per week for six weeks and a session on each day with 45 min duration. In training session subjects of experimental groups had fifteen minutes of warm up and fifteen minutes of warm down exercises involving jogging, mobility and stretching exercise.

Statistical Techniques

The following statistical procedures were employed to estimate the Impact of aquatic training and circuit training on selected physical variable among athletes. Analyze of covariance statistical techniques was used to test the adjusted post test means difference among the experimental group. The analysis of covariance on flexibility of pre and post test scores of experimental group and control group have been analyzed and presented in Table. The analysis of covariance on flexibility of the pre and post test scores of Circuit Training groups, Aquatic Training group and control group on have been analyzed and presented in Table I.

Table - 1

Analysis of covariance of the data on flexibility of pre and post tests scores of circuit training groups, aquatic training group and control group.

TEST	GROUP I	GROUP II	GROUP III	SOURCE OF VARIANCE	SUM OF SQUARES	DF	MEAN SQUARES	OBTAINED 'F' RATIO
Pre test Mean	13.33	13.40	13.20	Between	.311	2	.156	.01
S.D	4.11	4.12	3.18	Within	67.33	42	14.698	
Post test Mean	16.73	17.13	13.73	Between	103.6	2	51.81	3.37*
S.D	4.57	3.88	3.17	Within	645.6	42	15.31	
Adjusted Post test	17.38	17.99	13.72	Between	93.003	2	46.502	36.64*
				Within	52.03	41	1.269	

* Significant at .05 level of confidence.

(The table values required for significance at .05 level of confidence for 2 and 42 and 2 and 41 are 3.22 respectively).The adjusted post-test means of flexibility, circuit training group, aquatic training group and control group are 33.46, 34.58 and 27.92 respectively on flexibility the obtained 'F' ratio of 25.99 for adjusted post-test means is more than the table value of 3.22 for df 2 and 41 required for significance at 0.05 level of confidence on flexibility. The results of the study indicated that there was a significant difference between the adjusted post-test means of circuit training group, aquatic training group and control group on flexibility. Since, three groups were compared, whenever they obtained 'F' ratio for adjusted post test was found to be significant, the Scheffe's test to find out the paired mean differences and it was presented in Table I A.

Table-1A

THE SCHEFFE'S TEST FOR THE DIFFERENCES BETWEEN PAIRED MEANS ON FLEXIBILITY

Circuit Training	Aquatic Training	Control Group	Mean Differences	Confidence Interval Value
17.38	17.99	-	.61	.73
17.38	-	13.72	3.66*	.73
-	17.99	13.72	4.27*	.73

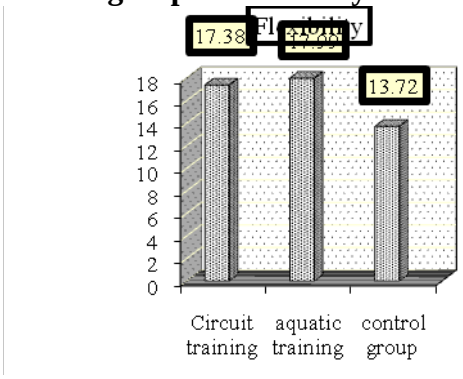
* Significant at .05 level of confidence.

Result of flexibility

The table I-A shows that the mean difference values between Circuit Training groups, Aquatic Training group and control group on flexibility 0.61, 3.66 and 4.27 which greater than the confidence interval value .73 required for significance at .05 level of confidence. The results of this study showed that there was a significant difference exists between circuit Training and Control group, Aquatic training and control group on flexibility. The adjusted post-test mean values of Circuit Training groups Aquatic Training and control group on flexibility were graphically represented in figure I.

Figure - 1

The adjusted post –test mean values of circuit training aquatic training and control group on flexibility



Discussion of findings

In Athletics muscular endurance, flexibility has been over emphasized to gain performance at any level of competition. The finding of study showed that there was significant improvement in flexibility due to the influence of Aquatic training and circuit training among Athletes.

Tsourlou (2006) aquatic training (AT) program supported that muscle strength, flexibility was improved due to influence of Aquatic training.

Conclusion

From the results of the present study undertaken certain limitations imposed by the experimental conditions, the following conclusions were arrived. The circuit training group and aquatic training group has produced significant improvement on flexibility greater than control groups. Aquatic training group has significant improvement on flexibility greater than circuit training group.

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