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EFFECT OF LAND AND AQUATIC PLYOMETRIC TRAININGS ON SELECTED PHYSICAL VARIABLES OF SWIMMERS

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Abstract

The purpose of the present study was to find out the effect of land and aquatic plyometric training on selected physical variables. The subjects of this study comprised of forty eight (n=48) swimmers from students of different Schools of Dubai, U.A.E age ranging from 14 to 16 years. The subjects were regular swimming practitioners. The selected subjects were randomly assigned to three groups of sixteen (n=16) each, such as two experimental groups and a control group. The Group I (n=16) underwent plyometric training in land, Group II (n=16) underwent plyometric training in aquatics for a duration of twelve weeks for three alternative days, in addition to the regular schedule, and Group III (n=16) acted as control group. The speed and strength parameters such as speed (50mts dash) explosive strength (standing broad jump), muscular strength (push-ups) were selected as dependent variables and land plyometric training, aquatic plyometric training were selected as independent variables for this study. The data were collected and analysed through analysis of covariance (ANCOVA). All of the statistical analysis tests were computed at 0.05 level of significance (P<0.05). The plyometric training in land and plyometric training in aquatic group had shown significant improvement in all the selected physical fitness variables among swimmers. The plyometric training in aquatic group was better than the plyometric training in land on muscular strength among the swimmers.

Key words: *Plyometric, land, Aquatic, Swimmers, Physical.*

Introduction

First documented as an effective training method by Soviet coaches in the middle of the last century, the main purpose of 'Plyometrics' is to increase the rate of force development, the key ingredient of power. By contrast, the main purpose of heavy weight training is to increase total force production that is maximum strength. Plyometric training is now a common element of elite sports training programmes. But, while its beneficial effects on the lower body are well documented, there is some doubt over how useful it is for upper body force development, writes Raphael Brandon. Plyometric training for the lower body nearly always takes the form of various jumping movements, such as hopping, bounding and drop jumps, while upper body Plyometrics often uses medicine ball throwing movements. Both of these types of movements have been well documented. However, research into the effectiveness of plyometric training is

less readily available than coaching manuals for the relevant exercises.

Aquatic exercise became popular in the early 1980's. In 1983, there were 200,000 water exercisers in the United States. That number has since jumped to over 2.5 million, and grows every day. (Herbold-Sheley, 1999). Although elderly women used to comprise the majority of participants, today we are seeing the younger generation, athletes, people interested in cross training, and those trying to regain fitness after an injury all involved in aquatic fitness training **(T'Jonck, 1999).**

There are many different programs that can be used in the water. Aquatic Step Training, Circuit Training, Interval Training, Aquatic Rehabilitative Assistance, Team Training, Deep Water Training, Shallow Water Training, and Plyometric Training are the main areas of aquatic fitness. While each area focuses on a different aspect of fitness, they are all inter-related. The area that this study focused on Strength Training in the circuit and plyometric fashion. There are many different ways to develop strength in the water, as well as on land. Strength training in the water requires minimal equipment, but does require a pool. Some helpful equipment may include resistance tubing, bands, buoyancy weights, and other resistance items. On land, one does not need any special area to work out in, but the equipment needed are much greater and heavier **(Mayo Clinic Staff 2004).**

Methodology

The purpose of the present study was to find out the effect of land and aquatic plyometric training on selected physical variables. The subjects of this study comprised of forty eight (n=48) swimmers from students of different Schools of Dubai, U.A.E age ranging from 14 to 16 years. The subjects were regular swimming practitioners. The selected subjects were randomly assigned to three groups of sixteen (n=16) each, such as two experimental groups and a control group. The Group I (n=16) underwent plyometric training in land, Group II (n=16) underwent plyometric training in aquatics for a duration of twelve weeks for three alternative days, in addition to the regular schedule, and Group III (n=16) acted as control group. The speed and strength parameters such as speed (50mts dash) explosive strength (standing broad jump), muscular strength (push-ups) were selected as dependent variables and land plyometric training, aquatic plyometric training were selected as independent variables for this study. The data were collected and analysed through analysis of covariance (ANCOVA). All of the statistical analysis tests were computed at 0.05 level of significance ($P<0.05$).

Discussion on Findings

Analysis of Data

The influence of independent variables on each criterion variable was analysed and presented below.

Table 1

ANALYSIS OF COVARIANCE FOR THE PRE, POST AND ADJUSTED POST TEST ON SELECETED PHYSICAL FITNESS VARIABLLES OF EXPERIMENTAL AND CONTROL GROUPS

variables	Test	Experimental Group-1	Experimental Group-2	Control Group	Source of variance	Sum of square	df	Mean square	F-ratio
Speed	Pretest Mean SD(±)	7.0188 0.47348	7.0050 0.44882	7.0125 0.52885	B.M W.G	0.002 10.580	2 45	0.001 0.235	0.003
	Post test Mean SD(±)	6.5956 0.3896	6.5669 0.37640	7.0306 0.52767	B.M W.G	2.161 8.579	2 45	1.080 0.191	5.667*
	Adjusted Post test SD(±)	6.591	6.572	7.031	B.S W.S	2.152 2.710	2 44	1.076 0.062	17.474*
Explosive Strength	Pretest Mean SD(±)	1.4644 0.08033	1.4656 0.11472	1.4613 0.08500	B.M W.G	0.000 0.403	2 45	0.000 0.009	0.009
	Post test Mean SD(±)	1.5575 0.06527	1.5850 0.11069	1.4775 0.08103	B.M W.G	0.100 0.346	2 45	0.050 0.008	6.486*
	Adjusted Post test SD(±)	1.557	1.583	1.480	B.S W.S	0.093 0.066	2 44	0.047 0.001	31.226*
Muscular Strength	Pretest Mean SD(±)	10.8750 3.6856	10.8125 2.37259	10.4375 1.7500	B.M W.G	1.792 334.125	2 45	0.896 7.425	1.121
	Post test Mean SD(±)	12.4375 2.70724	13.2500 2.20605	10.5625 1.78769	B.M W.G	60.792 230.88	2 45	30.396 5.131	5.924*
	Adjusted Post test Mean SD(±)	12.435	13.250	10.5625	B.S W.S	53.735 184.35	2 44	26.868 4.190	6.413*

B.M. –Between means W.G. – Within groups B.S. – Between sets W.S. – Within sets

******Significant at 0.05 level of confidence.*

(The table values required for significance at 0.05 level of confidence for 2 & 45 and 2 & 44 are 3.20 *and* 3.21 *respectively).*

The Table - 1 shows that the pre-test, post test ad adjusted post test mean values on Speed, explosive strength and Muscular strength of plyometric training in land, plyometric training in aquatics and control groups are presented in the above table. The obtained 'F' ratio 0.003, 0.009 and 1.121 for pre-test scores was less than the table value 3.20 for df 2 and 45 required for significance at 0.05 level of confidence on speed. The post-test Speed, explosive strength and muscular strength obtained 'F' ratio 5.667, 6.486 and 5.924 for post-test scores was greater than the table value 3.20 for df 2 and 45 required for significance at 0.05 level of confidence on speed. The adjusted post test 'F' ratio of speed, explosive strength and muscular strength are 17.474, 31.226 and 6.413 for adjusted post-test means was greater than the table value of 3.21 for df 2 and 44 required for significance at 0.05 level of confidence on all selected physical fitness variables. The results of the study indicated that there was a significant difference among the adjusted post-test means of plyometric training in land, plyometric training in aquatics and control groups.

Since the obtained 'F' ratio value was significant further to find out the paired mean difference, the Scheffe's test was employed further and presented in table- 2

Table-2

SCHEFFE'S TABLE ON SELECETED PHYSICAL FITNESS VARIABLLES OF EXPERIMENTAL AND CONTROL GROUPS

Variables	Experimental group-1	Experimental group-2	Control group	M.D	C.I
Speed	6.591		7.031	0.440*	0.223
		6.572	7.031	0.458*	
	6.591	6.572		0.019	
Explosive Strength	1.557		1.480	0.077*	0.028
		1.583	1.480	0.104*	
	1.557	1.583		0.026	
Muscular Strength	12.435		10.5625	1.8725*	0.490
		13.250	10.5625	2.6875*	
	12.435	13.250		0.815*	

It may be concluded from the result that there was no significant difference between adjusted post means of experimental groups '1' and '2'. Statistically significant difference existed between the experimental groups and the control group. From the result it was inferred that there existed a marginal difference between the experimental groups and won't favour of aquatic plyometric group.

FIGURE-1

SHOWING THE MEAN VALUES OF SPEED ON SELECETED PHYSICAL FITNESS VARIABLLES OF EXPERIMENTAL AND CONTROL GROUPS

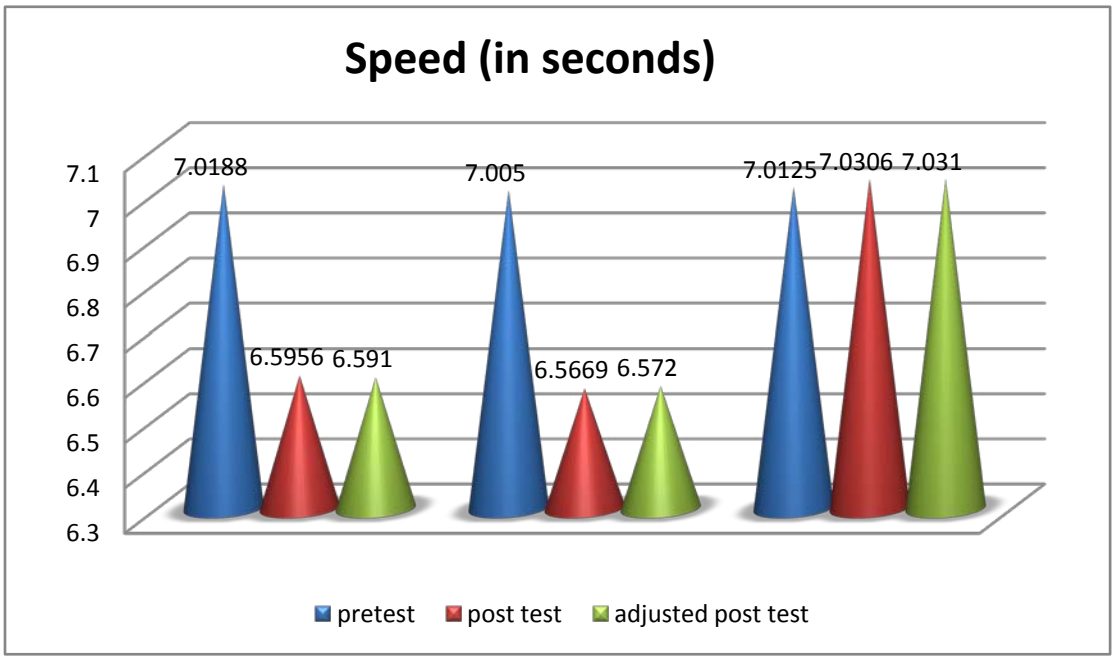


FIGURE- II

SHOWING THE MEAN VALUES OF EXPLOSIVE STRENGTH ON SELECETED PHYSICAL FITNESS VARIABLLES OF EXPERIMENTAL AND CONTROL GROUPS

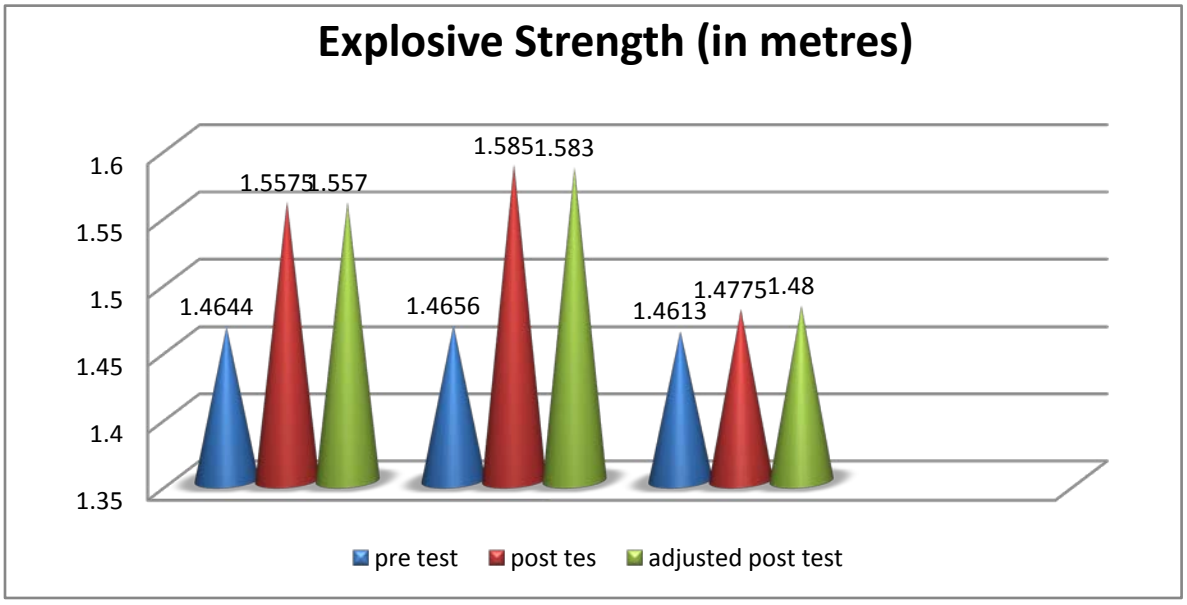
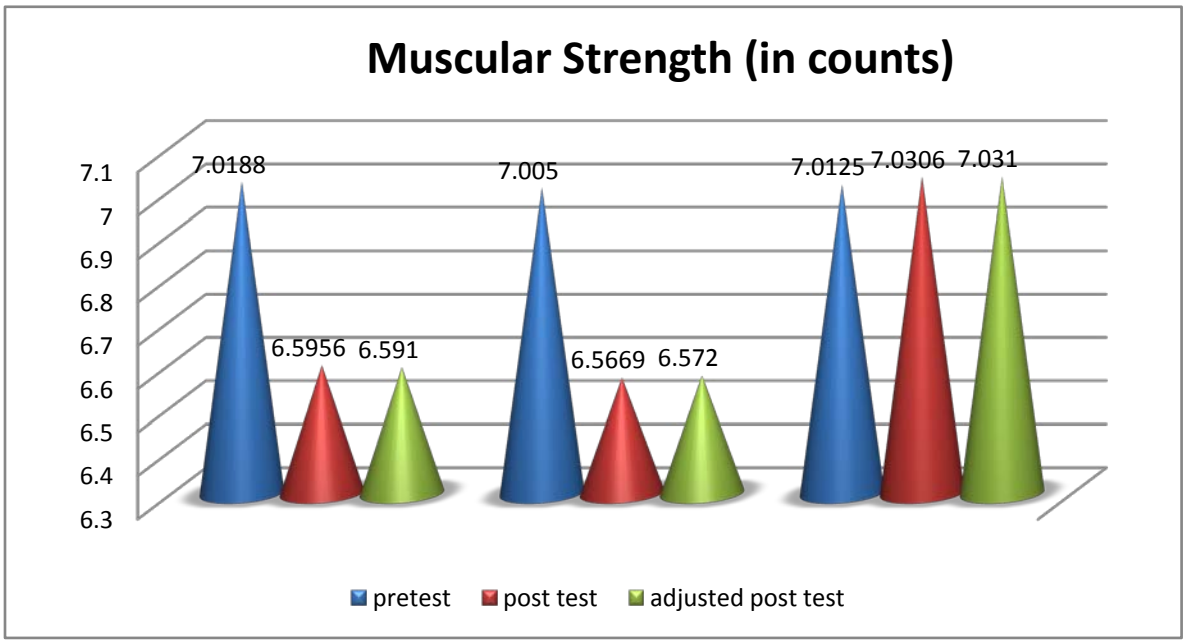


FIGURE-III

SHOWING THE MEAN VALUES OF MUSCULAR STRENGTH ON SELECETED PHYSICAL FITNESS VARIABLLES OF EXPERIMENTAL AND CONTROL GROUPS



Conclusions

From the analysis of the data, the following conclusions were drawn,

1. The control group had not shown significant changes in any of the selected variables.
2. The plyometric training in land and plyometric training in aquatic group had shown significant improvement in all the selected physical fitness variables among swimmers.
3. The plyometric training in aquatic group was better than the plyometric training in land on muscular strength among the swimmers.

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