EFFECT OF AQUATIC PLYOMETRIC TRAINING ON SELECTED STRENGTH RELATED PARAMETERS OF SENIOR SCHOOL GIRLS

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ABSTRACT

The purpose of the study is to examine the effect of aquatic plyometric training on selected strength related parameters of senior school girls. To achieve the purpose of the study two groups comprised of 15 girls each drawn from various schools of Dubai (UAE) namely GEMS Modern Academy(Dubai),Delhi Private school (sharjah), Delhi private school (Dubai), GEMS Millenium School(Dubai) and GEMS Our Own (Dubai) who regularly underwent basic swimming skill learning. The age group ranged from 13 to 15 years who were just enrolled for learning swimming. All the subjects were tested on the selected criterion variables namely explosive power, elastic power and strength. The selected subjects were randomly assigned to two groups named as control group (Group I) and experimental group (Group II). The experimental group underwent aquatic plyometric training for a duration of six weeks and the number of sessions per week was confined to three alternative days, in addition to their regular schedule. The collected data were statistically analyzed by using analysis of covariance (ANCOVA). In all the cases .05 level of confidence was fixed as a level of confidence to test the hypothesis. It was concluded that aquatic plyometric training achieved significant improvement on explosive power, elastic power and strength of senior school girls.

Key words: Aquatic plyometric training, explosive power, elastic power and strength

INTRODUCTION

Plyometric exercises are specialized, high intensity training techniques used to develop athletic power (strength & speed). Plyometric training involves high-intensity, explosive muscular contractions that invoke the stretch reflex (stretching the muscle before it contracts so that it contracts with greater force). The most common plyometric exercises include hops, jumps and bounding movements. These exercises typically increase speed and strength and build power. Plyometric training is a type of exercise designed to produce fast, powerful movements, and improve the functions of the nervous system, generally for the purpose of improving performance in sports. Plyometric is used to increase the speed or force of muscular contractions, providing explosiveness for a variety of sport-specific activities. Plyometric has been shown across the literature to be beneficial to a variety of athletes. Benefits range from injury prevention, power development and improvement in sprint performance. Plyometrics have been shown to have benefits for reducing lower-extremity injuries in team sports while combined with other neuromuscular training (*i.e. strength training, balance training, and stretching*). Another advantage to plyometrics is that the central and peripheral nervous systems are training to react with maximum speed, thus stimulation the muscles to shorten rapidly and produce maximum force. Plyometric drills can be used to convert an athlete's maximal strength training into sport-specific power helping to further improvement in performance.

Aquatic training of the plyometric training is not a new concept, but lately it has been gaining in is popularity, primarily due to a significantly lower probability of injury and load reduction on the joints that occur as amortization (Miller, Berry, Bullard, & Gilders, 2002). Earlier, the training in water was for the purpose of rehabilitation, and today, because of the high water density and greater resistance, training in water becomes an integral part of fitness preparation. Any movement in water requires an extra effort and muscle activation. Stemm and Jacobson (2007) compared the training of plyometrics in water with the training plyometric on dry. There was a statistically significant change in both groups, but no difference was found between the plyometric program on dry and in water. The aim of this study is to determine the effect of aquatic plyometric training on on selected strength related parameters of senior school girls.

METHODOLOGY

To achieve the purpose of the study two groups comprised of 15 girls each drawn from various schools of Dubai (UAE) namely GEMS Modern Academy(Dubai),Delhi Private school (sharjah), Delhi private school (Dubai), GEMS Millenium School (Dubai) and GEMS Our Own (Dubai) who regularly underwent basic swimming skill learning. The age

group ranged from 13 to 15 years who were just enrolled for learning swimming. As per the available literatures, the following standardized tests were used to collect relevant data on the selected three strength related variables and were presented in the table-I.

Table I: **Variables and Tests**

Sl. No	Criterion Variables	Test items	Unit of Measurement
1	Explosive Power	Sargent Jump Test	Centimetre
2	Elastic Power	Bunny Hop Test	Metre
3	Strength	Push-ups	Number

Experimental Design and Statistical Procedure

All the subjects were tested on the selected criterion variables. The selected subjects were randomly assigned to two groups named as control group (Group I) and experimental group (Group II). The experimental group underwent aquatic plyometric training for a duration of six weeks and the number of sessions per week was confined to three alternative days, in addition to their regular schedule. The collected data were statistically analyzed by using analysis of covariance (ANCOVA). In all the cases .05 level of confidence was fixed as a level of confidence to test the hypothesis.

ANALYSIS OF DATA

Table II: **Summary of Mean and Dependent 'T' Test for the Pre and Post Tests on Explosive Power, Elastic Power and Strength of Aquatic Plyometric Training Group and Control Group**

S.N	Variable	Aquatic Plyometric Training group			Control group		
		Pre test mean	Post test mean	t ratio	Pre test mean	Post test mean	t ratio
1.	Explosive Power	0.26	0.31	9.00*	0.28	0.279	0.43
2.	Elastic Power	0.69	0.74	8.26*	0.718	0.72	0.37
3.	Strength	11.13	13.4	7.98*	11	11.07	0.25

Table t-ratio at 0.05 level of confidence for 14 (df) =2.15

**Significant*

From table-II the dependent 't' test values between the pre and post test means of aquatic plyometric training group on explosive power, elastic power and strength are 9.00, 8.26 and 7.98 respectively. Since the obtained 't' test values of the experimental group were greater than the table value 2.15 with df 14 at .05 level of confidence. The dependent 't' test values between the pre and post test means of control group on explosive power, elastic power and strength were 0.43, 0.37 and 0.25 respectively. Since the obtained 't' test values of control group were lesser than the table value 2.15 with df 14 at .05 level of confidence, it was concluded that aquatic plyometric training group had registered significant improvement in the variables of explosive power, elastic power and strength.

The pre and post test data collected from the experimental and control groups on Explosive Power, Elastic Power and Strength is statistically analyzed by using analysis of covariance and the results are presented in table–III.

Table III: **Analysis of Covariance of Aquatic Plyometric Training Group and Control Group on Explosive Power, Elastic Power and Strength**

S.No	Variable	Adjusted post test mean		Source	SS	df	MS	F
		APTC	CON					
1.	Explosive Power	0.32	0.27	SSB	0.02	1	0.02	44.8*
				SSW	0.01	27	0.0004	
2.	Elastic Power	0.75	0.71	SSB	0.01	1	0.01	31.98*
				SSW	0.01	27	0.0004	
3.	Strength	13.34	11.12	SSB	36.96	1	36.96	37.37*
				SSW	26.7	27	0.99	

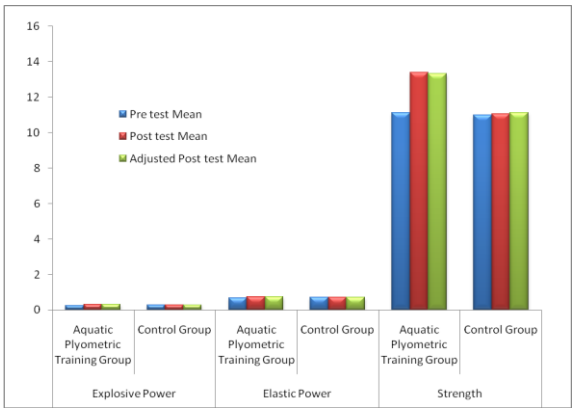
(The required table value for significance at 0.05 level of confidence with degrees of freedom 1 and 27 is 4.21)

**Significant at .05 level of confidence*

It is observed from table III that the F-ratio values for adjusted post test means value of aquatic plyometric training and control groups on explosive power, elastic power, and strength were 44.8, 31.98 and 37.37 respectively. The obtained F-ratio values were greater than the table value 4.21 with df 1 and 27 required for significance at 0.05 level of confidence. Hence, it is evident that there existed significant difference between the experimental and control groups on the development of explosive power, elastic power and strength.

The pre test, post tests and adjusted post test mean values of aquatic plyometric training and control groups on explosive power, elastic power and strength are graphically represented hereunder in figure I.

Figure I: **Pre Test, Post Tests and Adjusted Post Test Mean Values of Experimental and Control Groups on Selected Variables**



DISCUSSION

Plyometric exercises performed primarily in a vertical plane in shallow or deep water; uses movements that amplify drag by streamlining the body to create resistance. Aquatic exercises can increase the parameters like strength, speed, endurance, explosive power and aerobic capacity, according to recent researches (Rutledge, 2007 & Peyre–Tartaruga, 2009). In recent years Plyometric is considered as a high-intensity athletic conditioning program. Aquatic plyometric, a modified type of plyometric training is not a new concept, but it has recently become more popular because of the potential to decrease injuries compared with land plyometric contractions by decreasing impact forces on the joints (Miller et al., 2002 and Robinson et al., 2004).These studies have shown that both aquatic plyometric training with and without resistance training have benefits depending on the type and goal of training. The buoyancy effect of water makes aquatic training an optimal exercise environment for the players and individuals as impact and stress on joints is reduced (Kamalakkannan, 2010). Arazi, Coetzee & Asadi (2012) concluded that training plyometrics leads to an increase in jump height of 13cm versus, while the aquatic-plyometric training increases jump height 13.5 cm.

CONCLUSIONS

Based on the result obtained from the statistical analysis of the data it was concluded that the aquatic plyometric training achieved significant improvement on explosive power, elastic power and strength of senior school girls.

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