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IMPACT OF AQUATIC BASED PLYOMETRIC TRAINING ON SELECTED SKILLS RELATED MOTOR FITNESS COMPONENTS AND PERFORMANCE VARIABLES AMONG HANDBALL PLAYERS

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ABSTRACT

The purpose of the study was to find out the impact of aquatic based plyometric training on selected skill related motor fitness components namely agility, coordination, power and speed among male Handball players. To achieve the purpose of the study thirty male handball players have been randomly selected from various engineering colleges in the state of Tamil Nadu, India. The age of subjects were ranged from 18 to 25 years. The subjects had past experience of at least three years in handball and only who those represented their respective college teams were taken as subjects. A series of skill related motor fitness tests was carried out on each participant. These included agility assessed by T-agility test, coordination assessed by eye coordination, power assessed by vertical jump, speed assessed by 30mts dash and performance variable assessed by using subjective rating. The subjects were randomly assigned into two groups of fifteen each, such as experimental and control groups. The experimental group participated in the aquatic based plyometric training for 3 days a week, one session per day and for 8 weeks each session lasted 45 minutes. The control group maintained their daily routine activities and no special training was given. The subjects of the two groups were tested on selected variables prior and immediately after the training period. The collected data were analyzed statistically through analysis of covariance (ANCOVA) to find out the significance difference, if any between the groups. The 0.05 level of confidence was fixed to test the level of significance difference, if any between groups. The results of the study showed that there was significant differences exist between aquatic based plyometric training group and control group. And also aquatic based plyometric training group showed significant improvement on agility, coordination, power, speed and performance compared to control group.

Introduction

Water training can also help prevent future injuries by balancing the strength and flexibility of opposing muscle groups. To perform well in any sport you must train for the specific demands of that sport. Golfers must develop their swing, tennis players must strengthen their strokes and marathoners must run for miles. By taking the same training principles into the water, however, you can swing, run, jump and kick again and again – improving your skills and your sports-specific fitness and preventing potential injury. Sports-specific water training addresses every component of fitness, including strength, cardiovascular conditioning, flexibility and balance. Furthermore, the more you can duplicate specific sport skills in the water, the more you'll be able to enhance your performance on land.

Combined training of Water Fitness and land, will aid athletic performance by initiating the efficient use of more muscle fibers throughout the athlete's body. A land based athlete may work the biceps performing curls then the triceps with a separate exercise; however, during a vertical water workout session with the body aligned correctly, "each pair of the athletes' muscles (agonist and antagonist) are fully engaged as designed" (Feineman, 1994).

Although buoyancy reduces the stretch reflex and amount of eccentric loading during aquatic plyometric exercise, athletes encounter greater than normal resistance during concentric movements because of the viscosity of water. Thus, APT could provide a stimulus for improvement in a slightly different manner than land-based plyometrics.

Aquatic training resulted in similar training effects as land-based training with a possible reduction in stress due to the reduction of impact afforded by the buoyancy and resistance of the water upon landing (Stemm & Jacobsen, 2007). Aquatic exercise does not worsen the joint condition or result in injury (Wang, 2006). The resistance of the water promotes strengthening. Water acts as a variable 'accommodating' resistance (Prins, 2009). An aquatic training programme can decrease compression forces, vibration forces and torsional forces that a player may ensure while training on land (Roswell,2009). In recent years aquatic training became one of the most important training to improve the physical and physiological variables (Krishnan et al., 2005). The purpose of this study was to analyze the aquatic training on selected physical fitness variables among volleyball players.

Materials and Methods

The purpose of the study was to find out the impact of aquatic based plyometric training on selected skill related motor fitness components namely agility, coordination, power and speed among male Handball players. To achieve the purpose of the study thirty male handball players have been randomly selected from various engineering colleges in the state of Tamil Nadu, India. The age of subjects were ranged from 18 to 25 years. The subjects had

past experience of at least three years in handball and only who those represented their respective college teams were taken as subjects. A series of skill related motor fitness tests was carried out on each participant. These included agility assessed by T-agility test, coordination assessed by eye coordination, power assessed by vertical jump, speed assessed by 30mts dash and performance variable assessed by using subjective rating. The subjects were randomly assigned into two groups of fifteen each, such as experimental and control groups. The experimental group participated in the aquatic based plyometric training for 3 days a week, one session per day and for 8 weeks each session lasted 45 minutes. The control group maintained their daily routine activities and no special training was given. The subjects of the two groups were tested on selected variables prior and immediately after the training period. The collected data were analyzed statistically through analysis of covariance (ANCOVA) to find out the significance difference, if any between the groups. The 0.05 level of confidence was fixed to test the level of significance difference, if any between groups.

Aquatic based Plyometric training

Aquatic based Plyometric training group consisted of a 10-minute warm-up. The water level was just above the hip level. After that the aquatic based Plyometric training group performed the following aquatic exercises by 3 sets of 12 squat jumps, Single leg jump (alternative leg), double leg jump, High knee action, separated by 1- minute rests. These exercises were performed for 45 min in a day and for 3 days/week.

TABLE-I
Criterion measures

S.No	Criterion measure	Test items	Unit of measurement
1	Agility	T- Agility	In seconds
2	Coordination	Two large boxes (or) containers (capable of holding more than 5balls of 10inches diameter each) and a stopwatch	In seconds
3	Power	Vertical jump	In centimeters
4	Speed	30 meter dash	In seconds
5	Performance	Three qualified coach assess Volleyball ability in 10 Point scale	In points

TABLE – II
Descriptive analysis of selected skill related motor fitness Components and performance variables among control and experimental groups

S.No	riable	Group	e-Test Mean	SD (±)	- Test	SD (±)	Adjusted Mean
1	*Agility*	CG	12.28	0.08	12.11	0.09	12.10
		AQBPT	12.32	0.05	11.71	0.37	11.71
2	*Coordination*	CG	14.00	0.65	14.20	0.67	14.22
		AQBPT	14.20	1.08	15.26	0.70	15.23
3	*Power*	CG	55.40	0.82	62.40	1.88	62.39
		AQBPT	55.26	0.79	66.26	1.16	66.26
4	*Speed*	CG	4.81	0.30	4.68	0.27	4.69
		AQBPT	4.69	0.22	4.31	0.14	4.29
5	*Performance*	CG	4.94	0.63	5.05	0.48	5.05
		AQBPT	4.99	0.68	5.38	0.31	5.38

AQBPT= Aquatic based plyometric training group
CG= Control group

The tables-II the pre, post-test means, standard deviations and adjusted means on selected skill related motor fitness components of male Handball players were numerical presented. The analysis of covariance on selected variables of aquatic based plyometric training and control group is presented in table – III

TABLE – III
Computation of analysis of covariance on selected skill related motor fitness components and performance Variables among male Handball players

s.no	variable	Test	Sum of variance	Sum of squares	df	Mean square	F ratio
1	Agility	Pre-test	B.W	0.01	1	0.01	1.86
			W.G	0.14	28	0.005	
		Post-test	B.W	1.19	1	1.19	16.18*
			W.G	2.06	28	0.07	
		Adjusted means	B.S	1.09	1	1.09	14.33*
			W.S	2.06	27	0.07	
2	Coordination	Pre-test	B.W	0.30	1	0.30	0.37
			W.G	22.40	28	0.80	
		Post-test	B.W	8.53	1	8.53	17.92*
			W.G	13.33	28	0.47	
		Adjusted means	B.S	7.56	1	7.56	17.59*
			W.S	11.61	27	0.43	
3	Power	Pre-test	B.W	0.13	1	0.13	0.20
			W.G	18.53	28	0.66	
		Post-test	B.W	112.13	1	112.13	45.81*
			W.G	68.53	28	2.44	
		Adjusted means	B.S	111.55	1	111.55	43.95*
			W.S	68.51	27	2.53	
4	speed	Pre-test	B.W	0.12	1	0.12	1.66
			W.G	2.06	28	0.07	
		Post-test	B.W	1.02	1	1.02	21.16*
			W.G	1.35	28	0.04	
		Adjusted means	B.S	1.15	1	1.15	26.12*
			W.S	1.19	27	0.04	
5	Performance	Pre-test	B.W	0.01	1	0.01	0.03
			W.G	12.04	28	0.43	
		Post-test	B.W	0.81	1	0.81	4.85*
			W.G	4.66	28	0.16	
		Adjusted means	B.S	0.84	1	0.84	5.08*
			W.S	4.46	27	0.16	

W.G=between groups **W.G**= within groups
B.S=between sets **W.S**=within sets

*Significant at 0.05level of confidences

(Table value for df 1 and 28 was 4. 20, Table value for df 1 and 27 was 4.21)

In the table the results of analysis of covariance on agility, coordination, power, speed and performance. The obtained 'F' ratio of 1.86, 0.37, 0.20, 1.66 and 0.03 for Pre-test means was less than the table value of 4.20 for df 1 and 28 required for significance at 0.05 level of confidence on agility, coordination, power, speed and performance. The obtained 'F' ratio of 16.18, 17.92, 45.81, 21.16 and 4.85 for post-test means was greater than the table value of 4.20 for df 1 and 28 required for significance at 0.05 level of confidence on agility, coordination, power, speed and performance. The obtained 'F' ratio of 14.33, 17.59, 43.95, 26.12 and 5.08 for adjusted post-test means was greater than the table value of 4.21 for df 1 and 27 required for significance at 0.05 level of confidence on agility, coordination, power, speed and performance. The result of the study indicated that there was a significant difference among the adjusted post test means of aquatic based plyometric training group and control group on agility, coordination, power, speed and performance. And also aquatic based plyometric training group showed significant improvement on agility, coordination, power, speed and performance compared to control group.

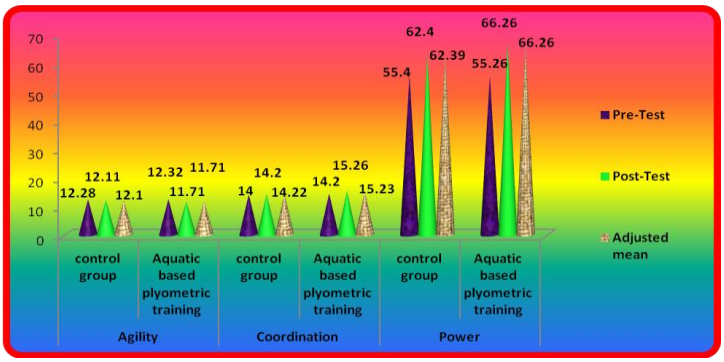

Figure-I The pre, post and adjusted mean values of agility, coordination and power of both control and experimental groups are graphically represented in the figure-I

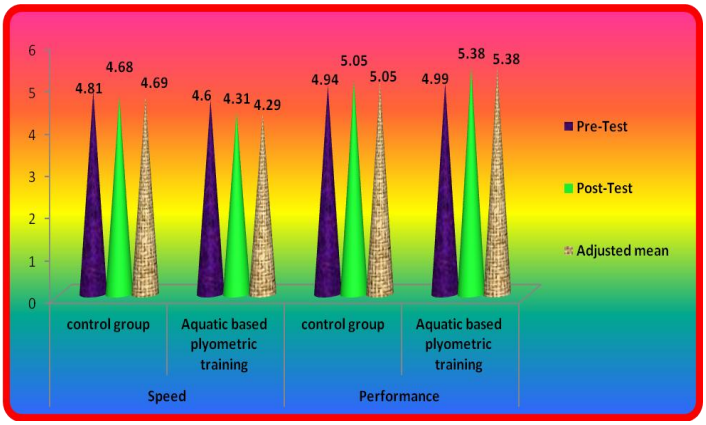

Figure-II The pre, post and adjusted mean values of speed and performance of both control and experimental groups are graphically represented in the figure-II

Discussion of findings

The results of the study indicate that the experimental group which underwent aquatic based Plyometric had showed significant improved in the selected variables namely such as agility, coordination, power, speed and performance when compared to the control group. The control did not show significant improvement in any of the selected variables. The past studies on selected physical fitness components reveals Kamalakkannan et, al (2010). Who had found that aquatic training group shows significant improvement in speed, endurance and explosive power. Kamalakkannan et, al (2010). Opined that aquatic training and ATWG produced positive impacts on the agility and explosive power among volleyball players. Stemm et, al (2007). found that plyometric training in water can be an effective technique to improve sprint and strength in young athletes.

Conclusions

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

1. The experimental group Handball players showed significant improvement in all the selected skill related motor fitness components and performance such as agility, coordination, power, speed and performance.
2. The control group Handball players did not show significant improvement in any of selected variables.

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