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Training sequel of aquatic plyometric training on selected physical parameters among male soccer players

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Abstract
Explosiveness is a must have ability in the modern football. Plyometrics is indispensable to accomplish the extreme performance of a soccer player. Therefore, soccer players should opt different type of training methods to develop the explosiveness. This research aims to assess whether is there any effect of 12 weeks aquatic plyometric training on selected physical parameters among male soccer players. To accomplish the purpose of the current study thirty soccer players who were active in-game age ranged from 20 to 25 years old randomly selected from University of Madras. They are randomly divided and employed into two equal groups, consist of 15 members each. Group-I had Given an hour package of aquatic plyometric training, and Group-II was control which had not received any unique pieces of exercise apart from the regular activities. The Aquatic Plyometric training has selected as the independent variable. Speed and Explosive leg power have chosen as dependent variables, and all dependent variables measured by standardized test item as 50 meters Dash and Sargent Jump. Analysis of Covariance (ANCOVA) would be applied to find out the significant mean differences. In all the cases, the 0.05 level of confidence has fixed to test the level of significance. The results of the study exposed that the experimental group had finished a significant difference in all the selected variables such as Speed and Explosive leg power to compare the control group. Hence it was concluded that Aquatic Plyometric training enhanced Speed and Explosive leg power among Soccer players.

Keywords: aquatic plyometric training, speed, explosive leg power

1. Introduction
The aquatic environment often thought as a typical workout vs. working out with ease. Buoyancy properties allow you to move with ease, which in turn will enable you to exercise at a higher intensity with less impact on the body. Water provides more resistance than air due to the water's viscosity, which creates strength in all directions of movement and includes the overload that is perfect for your plyometric workouts. The buoyant forces of water give a cushioning effect, which protects your muscles, joints, and bones from the impact. The buoyancy of the water also helps reduce the effect that felt during land-based exercise.

1.1 Plyometric Training
Plyometrics is indispensable to accomplish the extreme performance of a soccer player. It is a type of workout drill designed to produce fast, powerful movements, and improve the functions of the nervous system, usually for the persistence of enhancing performance in sports. Plyometric moves, in which a muscle is overloaded and then contracted in quick order, use the strength, elasticity, and innervation of muscle and surrounding tissues to jump higher, run faster, throw farther, or hit harder, depending on the chosen training goal. It is used to increase the speed or force of muscular contractions, providing explosiveness for a variety of sport-specific activities.

1.2 Aquatic Plyometric Training
Aquatic plyometric exercise is a plyometric exercise which is performed in water. It is a type of workout that will be done in a pool compared to the plyometric training usually done on land. According to Steven Devor, assistant professor of sport and exercise sciences at Ohio State University, "doing plyometric exercise in a pool can significantly reduce muscle soreness".

2. Review of Literature
Ploeg *et al.* studied that the effects of high volume aquatic plyometric training on vertical jump, muscle power, and torque. The results of the study have shown that the significant improvement in the performance variables. Martel *et al.* examined that the effects of aquatic plyometric training on vertical jump and muscular strength in volleyball players. The results of the study indicated that combination of aquatic plyometric training and volleyball training resulted in more extensive improvements in vertical jump than in the control group. Rakesh Dubey. evaluated that the relationship of land and water-based exercise in improving cardiovascular fitness, muscular strength and speed among soccer Players. The results of the research specified that long-term water based performing practices were better than the land-based performing exercises in improving cardiovascular fitness, muscular strength and speed of beginner soccer players. Hanalei. Examined that the effects of an aquatic-plyometric training program on vertical jump height compared with land-based plyometric training. The study has concluded that there were significant increases in vertical jump height after six weeks of training due to aquatic plyometric training. Arazi. Studied that the effect of aquatic and land plyometric training on strength, sprint, and balance in young basketball players.

The study has exposed that there was a significant improvement in the aquatic plyometric training and control group. They conclude that plyometric training in water can be a useful technique to improve sprint and strength in young athletes.

3. Definition of the Terms

3.1 Speed

It is the performance prerequisite to do motor actions under given conditions in minimum of time.

3.2 Explosive Power

Explosive power may be identified as the ability to release maximum force in the fastest possible time, as is exemplified in the vertical jump, broad jump and other movement against a resistance in a minimum time.

4. Methodology

4.1 Subjects

For the achievement of the resolution of the current study, the investigator selected a total number of thirty (N=30) soccer players had been chosen randomly from University of Madras, Chennai. The participants' age ranged from 20 to 25 years. The subjects were voluntarily participated to conduct the study. They were simplified into two groups. Each group consists of 15participants, which were assumed to be apt for the study.

4.2 Selection of Variables and Tests

Aquatic plyometric training profoundly influenced by physical aspects. It had found from the literature that these variables might have a significant effect on aquatic plyometric training. Hence, the investigator seriously got interested to know whether there was any significant enhancement or not in the following variables.

Table 1: Selection of Tests

Variables	Test
Speed	50 Meters Dash
Explosive Leg Power	Sargent Jump

4.3 Experimental design

The experimental treatment allocated aquatic plyometric training to the experimental group. The pre-test and post-test random group design used in the present study. The selected subjects randomly assigned to experimental and control group of 15 each. Group-I had given an hour of aquatic plyometric training, and Group-II was control which had not received any unique pieces of exercise apart from the regular activities. The groups tested on selected criterion variables such as speed and explosive leg power before and after the training programme.

4.4 Treatment and Training Program

Throughout the training period, the experimental group underwent aquatic plyometric training for five days per week for twelve weeks. The workout lasted to 60 minutes/session including dynamic warming up, soccer-specific training and warming down periods. Participants completed five training sessions per week over a 12-week period (60 sessions). Control group were instructed not to participate in any strenuous physical exercise and specialized training throughout the training programme.

Table 2: Poly metric Training for Experiment Group

Weeks	Exercises	Sets	Repetition	Intensity
1-2 week	Hacky Sack	2	8	Low
	Hop Scotch	2	8	Low
	Jumping Jack	2	8	Low
	Cross Country Ski	4	6	Low
	Frog	4	6	Low
	45-Degree Kicks	4	6	Low
2-4 week	Hacky Sack	2	10	Low
	Hop Scotch	2	10	Low
	Jumping Jack	2	10	Low
	Cross Country Ski	5	5	Medium
	Frog	5	5	Medium
	45-Degree Kicks	5	5	Medium
4-8 week	Hacky Sack	3	10	Low
	Jumping Jack	3	10	Low
	Frog	3	10	Medium
	45-Degree Kicks	5	8	Medium
	Double 45-Degree Kicks	5	8	High
	Squat Jump	5	8	High
8-12 week	Jumping Jack	4	12	Low
	Frog	4	12	Low
	Jumping Jack with Knee Tuck	4	12	Medium
	Cross Country Ski Knee Tuck	6	10	High
	Squat Jump	6	10	High
	Lunge Jump	6	10	High

4.5 Test Administration and Measurements

The selected variables in the present study were 50 meters dash and Sargent jump to measure the speed and explosive leg power. The test was administrated in the following way.

50 meters dash: The purpose of this analysis was to measure the speed of the subjects. Procedure: After a short warm-up period the subject takes a position behind the starting line. The starter used the command ready and clap, the subject run across the finish line, which will be drawn at 50 meters. From the starting line, as fast as possible. Scoring: The score is the elapsed time to the nearest tenth second between the starting signal, and the subject crosses the finish line.

Sargent Jump:

To measure the Explosive leg power.

Procedure

The person stands side on to a wall and reaches up with the hand closest to the wall. Keeping the feet flat on the ground, the point of the fingertips is marked or recorded. This is called the standing reach. The person puts chalk on their fingertips to mark the wall at the height of their jump. The person then stands away from the wall and jumps vertically as high as possible using both arms and legs to assist in projecting the body upwards. Attempt to touch the wall at the highest point of the jump. The difference in distance between the standing reach height and the jump height is the score. The best of three attempts is recorded.

Scoring

The jump height is usually marked as a distance score. Recorded in centimeters as the score.

4.6 Statistical Procedure

The pre-test and post-test random group design used in the present study. The data collected from groups before and after completion of the training period on selected criterion variables. The selected variables were statistically examined for significant differences if any, by applying the analysis of covariance (ANCOVA). To find the significance 0.05 level of confidence fixed.

5. Results

The subjects were tested on selected criterion variables such as speed and explosive leg power at before and immediately after the training period. The analysis of covariance on speed and explosive leg power of aquatic plyometric training group and control group are analyzed and presented in given below tables respectively.

Table 3: Analysis of Covariance on Speed of Aquatic Plyometric Training and Control Group

	Aquatic Plyometric Training Group	Control Group	Source of Variance	Sum of Square	df	Mean Square	'F' ratio
Pre-test Mean	7.154	7.156	Between	0.000	1	0.000	0.010
S.D.	0.036	0.037	ithin	0.039	28	0.001	
Post-test Mean S.D.	7.132	7.160	Between	0.006	1	0.006	3.709*
	0.037	0.043	Within	0.047	28	0.002	
Adjusted Post-test Mean	7.133	7.160	Between	0.006	1	0.006	42.30*
			Within	0.004	27	0.000	

* Significant 0.05 level of confidence

(The table values required for significance at 0.05 level of confidence with df 1 and 28 and 1 and 27 were 4.20 and 4.21 respectively).

Table-3 showed that the pre-test mean values of speed for aquatic plyometric training group and control group were 7.154 ± 0.036 and 7.156 ± 0.037 respectively. The obtained 'F' ratio value of 0.010 for pre-test scores of aquatic plyometric and control groups on speed was less than the required table value of 4.20 for significance with df 1 and 28 at 0.05 level of confidence.

The post-test mean values for speed for aquatic plyometric training and control group were 7.132 ± 0.037 and 7.160 ± 0.043 respectively. The obtained 'F' ratio value of 3.709 for post-test scores of aquatic plyometric training and control group was less than the required table value of 4.20 for significance with df 1 and 28 at 0.05 level confidence.

The adjusted post-test mean values of speed for aquatic plyometric training and control group were 7.133 and 7.160 respectively. The obtained 'F' ratio value of 42.30 for adjusted post-test scores of aquatic plyometric training and control group was more significant than the required table value of 4.21 for significance with df 1 and 27 at 0.05 level of confidence.

The mean values of aquatic plyometric training and control group on speed were graphically represented in Figure-I.

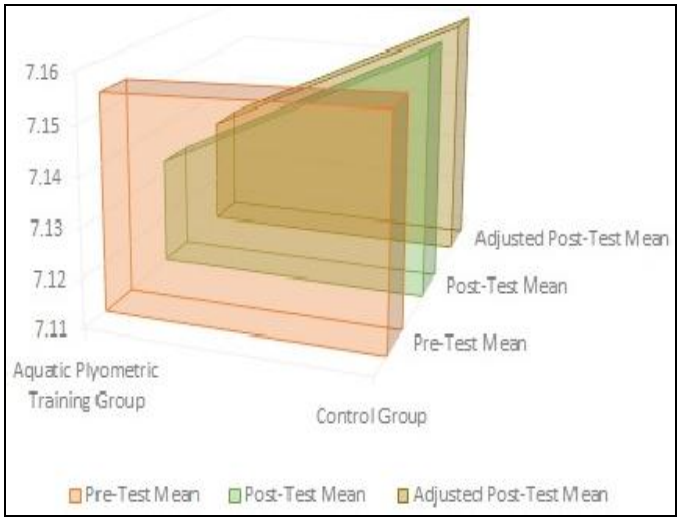

Fig 1: Bar Diagram Showing the Mean Values of Aquatic Plyometric Training and Control Group on Speed

Table 4: Analysis of Covariance on Explosive Leg Power of Aquatic Plyometric Training and Control Group

	Aquatic Plyometric Training Group	Control Group	Source of Variance	Sum of Square	df	Mean Square	'F' ratio
Pre-test Mean S.D.	36.93	35.60	Between	13.33	1	13.33	1.565
	2.374	3.376	Within	238.5	28	8.519	
Post-test Mean S.D.	40.86	34.40	Between	313.6	1	313.6	35.50*
	1.641	3.869	Within	247.3	28	8.833	
Adjusted Post-test Mean	40.28	34.97	Between	200.1	1	200.1	80.36*
			Within	67.23	27	2.490	

* Significant 0.05 level of confidence

(The table values required for significance at 0.05 level of confidence with df 1 and 28 and 1 and 27 were 4.20 and 4.21 respectively).

Table 4 showed that the pre-test mean values of explosive leg power for aquatic plyometric training group and control group were 36.93 ± 2.374 and 35.60 ± 3.376 respectively. The obtained 'F' ratio value of 1.565 for pre-test scores of aquatic plyometric and control groups on explosive leg power was less than the required table value of 4.20 for significance with df 1 and 28 at 0.05 level of confidence.

The post-test mean values for explosive leg power for aquatic plyometric training and control group were 40.86 ± 1.641 and 34.40 ± 3.869 respectively. The obtained 'F' ratio value of 35.50 for post-test scores of aquatic plyometric training and control group was higher than the required table value of 4.20 for significance with df 1 and 28 at 0.05 level confidence.

The adjusted post-test mean values of explosive leg power for aquatic plyometric training and control group were 40.28 and 34.97 respectively. The obtained 'F' ratio value of 80.36 for adjusted post-test scores of aquatic plyometric training and control group was more significant than the required table value of 4.21 for significance with df 1 and 27 at 0.05 level of confidence.

The mean values of aquatic plyometric training and control group on explosive leg power were graphically represented in Figure-II.

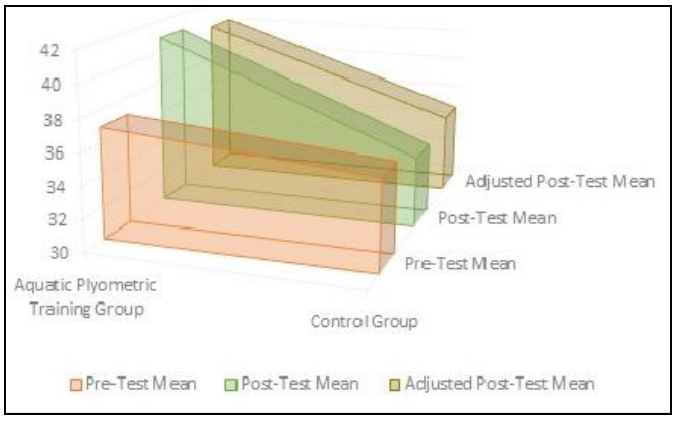

Fig 2: Bar Diagram Showing the Mean Values of Aquatic Plyometric Training and Control Group on Explosive Leg Power

6. Conclusions

The results of the current study indicated that twelve weeks aquatic plyometric training led to significant improvements in speed and explosive leg power among footballers. Furthermore, Aquatic plyometric training evidenced more effective in increasing speed and explosive leg power, the training method appears to endorse fitness. Based on the results of the study the investigator recommend that a similar research can be conducted for a different sport, age, and gender. It also suggests that same research can be performed with physiological and motor fitness components also.

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