



Impact Of Aquatic Resistance Training And Boot Camp Training For Inter-Collegiate Athletes 100 Meter Sprint

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Abstract

Aim and Background of the Study: Professional Athletes need to have a good speed throughout his run on track. To achieve it, athletes are given training in aquatic Resistance Method and Boot Resistance Method and made to perform on ground to compare the Effectiveness of Training. The aim is to increase the endurance of athletes by giving resistance training in two Different Methods.

Methodology: This is an Experimental Study of comparative pre-test and post-test type. 30 Subjects are included in the study for duration for of 8 Weeks. Subjects were divided into 2 Groups each consisting 15 subjects in Group -A&B. Group "A" were assisted with Boot Camp Training and Group "B" were assisted with Aquatic Resistance Training. The subjects were selected accordingly to the Inclusion Criteria of age Group 18-25 and Exclusion Criteria are below 18 years and above 25 years.

Result: On comparing Pre test and Post test within Group A& Group B on 40 Yard dash score Shows highly significant difference in Mean values at $P \leq 0.001$.

Conclusion: The study concludes and demonstrates the benefits that boot camp training has an increasing performance variable similar to aquatic resistance training.

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Keywords: Athletes; Aqua Resistance Training; Boot Camp Training; 100-Meter sprint.

INTRODUCTION

Competitive running, jumping, throwing, and walking are all part of the sporting events that make up athletics. Track and field, cross-country, road, and race walking are the most popular sports competitions.

While finishing position (or time, where measured) determines the outcome of racing events, the winner of a jump or throw is determined by the competitor who obtains the highest or furthest measurement after a series of tries¹.

The term "athletics" refers to both the human competitive physical skill-based sports and games as well as the methods of training that get athletes ready for competition performance. By altering the speed at which they move in the water, athletes can modify the intensity of their training. For instance, three times the speed of an arm movement results in nine times the resistance. With each arm and leg movement through the water, muscles are massaged. The water setting offers the athlete a particularly special type of training environment. Water has a few physical characteristics that set it apart from more conventional land-based training^{2,3}.

A hydrostatic force According to Pascal's law, the pressure from the liquid is applied uniformly to all sides of the submerged object at any given depth. The amount of liquid above the liquid and, consequently, the hydrostatic pressure, increase as the liquid's density and depth do. The friction that takes place between individual molecules of a liquid, producing resistance to flow, is known as viscosity. Because the molecules of the liquid cling to the surface of the body, viscosity is only apparent when there is motion through the liquid and acts as resistance to motion. Regardless of buoyancy, most movement in water is opposed because water is more viscous than air^{4,5}.

A body submerged partially or entirely in a fluid will feel an upward thrust proportional to the weight of the fluid that was displaced, according to Archimedes' principle of buoyancy. Buoyancy enables the assistance, resistance, and support of underwater motions. The capacity of a human to float in water is caused by this property of water. Some athletes, though, will require buoyancy aid from flotation devices⁶⁻⁹.

METHODOLOGY

Thirty subjects were selected and divided into two groups based on selection criteria and following protocols were given, Group A(Boot camp training) consists of Tyre rolling, Athlete resistance, parachute aid, Dumbbells hold walking Group B (Aquatic training) Aquatic jogging, Burdenko method, aquatic drills. Training should be given to the Subjects Continuously For 8 weeks (Repetitive of Training Along with warm up and cool down 5 Days per week, This Alternative days Training is Maintained Throughout the Session. They are two session (morning/evening session) per day up to 8 weeks/2 months).The study setting was carried at Boot camp resistance exercise are should be given in the setting of MARINA BEACH Chennai and the following protocols are given for 1 hour without interval. Aquatic resistance exercise is given in the setting of ANNA SWIMMING POOL Chennai and the following protocols are given for 1hour without interval. Warm up exercises low jogging, ballistic stretching, Agility drills. Cool down exercise 3-5 minutes of slow walking, calf stretch, Hamstring stretch, Quadriceps stretch.

Inclusion criteria: Age group of 18-25 years, Athletes and Elite Sprinters were included in the study.

Exclusion criteria: Subjects with hydrophobia, Partial/mild injury and uncooperative patients were excluded from the study.

Intervention

Group A- Boot Camp Training: The subjects were given warm-up exercises for a period of 10 minutes before starting the training session. It included jogging, stretching, rotation at various joints, walking on heels and toes, forward bend, backward bend, sideward stretch, rotation of shoulder joints, hip joints, stretching of calf and quadriceps muscle groups. Training Schedule: The following protocols are given by different intensity according to the weeks. The following exercises are given in low intensity for first 2 weeks and then it increases to medium level for the following 3rd, 4th, and 5th week at last it has been reached the maximum level of intensity training for 6th, 7th, and 8th week.

Training week	Resistance training	Training intensity
1	Side-to-side ankle hops Standing jump and reach Front cone hops	Low Low Low
2	Side-to-side ankle hops Standing jump and reach Front cone hops Double-leg hops	Low Low Low Low
3	Side-to-side ankle hops Standing jump and reach Front cone hops Double-leg hops Lateral cone hops	Medium Medium Medium Medium Medium
4	Single leg hops	Medium
5	Double leg hops	Medium
6	Lateral cone hops	high
7	Tuck jump with kneesup	high
8	Lateral cone hops	high

Fig: 1. Training Schedule protocols

Warm Down 10 min. After the training sessions the subjects were asked to relax the muscle by low jogging and light stretching etc.

Group-B Aqua Resistance Training Preparing for the pool

Instructions for pool exercise program: Water shoes will help to provide traction on the pool floor, Water level can be waist or chest high, Use a Styrofoam noodle or floatation belt/vest to keep you afloat in deeper water, Slower movements in the water will provide less resistance than faster movements, Use a webbed water gloves, Styrofoam weights, inflated balls, or kickboards for increased resistance, Never push your body through pain during any exercise, Although you will not notice that you sweat with pool exercises, kickers it is still important to drink plenty of water, Aqua Resistance Training Aquatic Drills, Forward and side lunges, Hip kicker at pool wall, Pool planks, Deep water bicycle, Standing knee lift.

Plyometrics Speed Training:

Experimental Groups:

The collected data were tabulated and analysed using both descriptive and inferential statistics. All the parameters were assessed using statistical package for social science (SPSS) version 24. Paired t-test was adopted to find the statistical difference within the groups & Independent t-test (Student t-Test) was adopted to find statistical difference between the groups.

#40YARD DASH	#Group - A		#Group - B		t - TEST	df	Significance
	MEAN	S.D	MEAN	S.D			
PRE TEST	5.774	.353	5.770	.306	.034	28	.943*
POST TEST	5.157	.307	5.494	.312	-2.97	28	.000***

Table-1: Comparison of 40 Yard Dash Score Between Group – A and Group - B in Pre And Post Test, (*- $P > 0.05$), (***- $P \leq 0.001$)

The above table reveals the Mean, Standard Deviation (S.D), t-test, degree of freedom(df) and p-value between (Group A) & (Group B) in pre test and post test weeks. This table shows that there is no significant difference in pre test values between Group A& Group B (* $P > 0.05$). This table shows that statistically highly significant difference in post test values between Group A& Group B (***- $P \leq 0.001$).

#40 Yard Dash	Pre Test		Post Test		t - TEST	Significance
	MEAN	S.D	MEAN	S.D		
GROUP- A	5.774	.353	5.157	3.07	14.78	.000***
GROUP- B	5.770	.306	5.494	.312	12.62	.000***

Table-2. Comparison of 40 yard dash score within Group A & Group B between pre & post test values. (***- $P \leq 0.001$)

The above table reveals the Mean, Standard Deviation (S.D), t-value and p-value between pre-test and post-test within Group – A & Group – B. There is a statistically highly significant difference between the pre test and post test values within Group A and Group B (***- $P \leq 0.001$).

RESULTS

On comparing the Mean values of Group A & Group B on 40 Yard dash score, it shows significant decrease in the post test Mean values in both groups, but (Group A- Boot Camp Training) shows 5.157 seconds which has the lower Mean value is effective than (Group B - Aquatic Resistance Training) 5.494 seconds at $P \leq 0.001$. On comparing Pre test and Post test within Group A & Group B on 40 Yard dash score shows highly significant difference in Mean values at $P \leq 0.001$.

DISCUSSION

When comparing land-based and aquatic-based training, the researchers would expect to observe differences in the amount of force applied during the landing phase and in the time interval of the amortization phase of the activity. Because of the buoyant force of water decreased, landing force is increased, thereby facilitating a more rapid amortization phase. By decreasing the amount of force applied during aquatic training by researcher might expect to facilitate a more rapid transition from eccentric to concentric activity¹⁰⁻¹².

While the land training group trains with a larger load (no buoyancy effect) and experiences a longer amortisation phase, the aquatic training group enjoys a faster transition time (shorter amortisation phase). A bigger load and Dr. quicker amortisation training stimulus would be anticipated to result in gains in power at higher velocities, in accordance with speed specificity. This idea could contribute to the explanation of why the muscle-power output of the boot camp training group improved¹³⁻¹⁵.

As the foot is near to the base rather than on top, the cross over parallel stance does allow use of the base to push off against. In order to generate the least amount of momentum possible by leaning forward toward the next base, it is also necessary to pivot toward that base rather than pushing off the base directly in the direction of the sprint. When compared to the rear foot on the base and the cross over stances, studies show that employing the front foot on the base posture reduces the 45- and 15-foot sprint times for Division I female softball players^{16,17}.

The parallel start had considerably longer ground contact time, time to peak force, and times from peak force to toe-off (vertical and horizontal). These temporal factors have a stronger correlation (0.42 r 0.75) with sprint performance than any kinetic metric. Because it enhances push-off and the temporal aspects of the first step, the false start seems to be advantageous across short distances^{18,19}.

The degree of contractile activity influenced how much electrical stimulation affected active transport of certain amino acids within an hour. Protein breakdown was also slowed down by stimulation or passive stretching of the soleus or diaphragm. These mechanical activity-related effects probably play a role in the modifications that hypertrophy in vivo causes²⁰.

Ethical Clearance: This study has obtained ethical clearance to conduct from Faculty of Physiotherapy, DR.MGR. Educational and Research Institute, Chennai, with reference number: A-039/ PHSIO/IRB/2019-20 dated 07/01/2020.

Conflict of Interest: The authors declare that they have no conflicts of interest and no funding has been obtained from any source.

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Authors Contribution: Mr. L. Subbiah conducted this study with required number of samples and did data collection. Dr. R. Jayabharathi contributed in data analysis and discussion part of the study. Dr. Jibi Paul, PhD and Dr. P Sathya supported with manuscript preparation and summarise the research work.

CONCLUSION

The study concludes and demonstrates the benefits that boot camp training might have an increasing performance variable similar to aquatic resistance training. In addition, the buoyant properties of water can provide a decreased load during the eccentric phase of the exercise, and the drag properties can provide a resistance load for training during the concentric phase. These findings might be beneficial for health-care professionals who are looking for alternative programs to stimulate increases in performance variables. Finally, most jumping or bounding activities on land can be conducted in water without requiring special equipment (except a pool) or preparation time may be the water reduces the injury, but could not develop the more resistance when compared to the land resistance.

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