



EFFECT OF AQUATIC TRAINING ON INSPIRATORY AND EXPIRATORY RESERVE VOLUME AMONG PREADOLESCENT BOYS

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Abstract: The purpose of the study was to find out the effect of aquatic training on inspiratory reserve volume and expiratory reserve volume among preadolescent boys. To achieve the purpose of this study, 30 preadolescent boys were randomly selected as subjects from Thoothukudi District, Tamilnadu, India. Their age were ranged from 12 to 14 years. The selected members were randomly separated into two groups such as group 'I' undertook yogic training (n=15) and group 'II' acted as control group (n=15). Group 'I' underwent aquatic training for six days in a week and one session per day and each session lasted for 45 minutes for nine weeks. Group 'II' was not exposed to any specific training but they were participated in regular activities. The data on inspiratory and expiratory reserve volume were collected by administering with Wet Spiro meter. The pre and post-tests data were collected on selected criterion variables prior to and immediately after the training programme. The pre and post-test scores were statistically surveyed by the dependent 't' test and Analysis of Co-Variance (ANCOVA) for each and every selected variable unconnectedly. It was concluded that the Aquatic training group had shown significantly improved in inspiratory and expiratory reserve volume. However, the control group had not shown any significant improvement on any of the selected variables such as inspiratory and expiratory reserve volume.

Index Terms – Aquatic Training, Inspiratory Reserve Volume, Expiratory Reserve Volume

1. INTRODUCTION

Performing physical activities is vital for both body and soul. Being physically active contributes to feelings of health, wellness and a high quality of life. Research indicates that physical activities impact teenagers' social relations with their peers and parents [1].

Aquatic exercises are also beneficial in several musculoskeletal conditions and have become more popular in the recent years. It can be applied to children to improve fitness and function, as the properties of water reduce excessive joint loading and enhance strengthening, providing assistance to children with decreased postural control and muscle weakness [2].

Water offers a unique exercise medium in which reduced-gravity conditions decrease the impact forces on joints, while the water itself creates resistance to movement. Aqua aerobic means doing exercise in water is concern. You can do aqua aerobics as a full workout or just as a warm-up before doing other water based activities. The body will warm up quickly as it vigorously burns calories and increases the cardio respiratory strength and endurance. [3].

An aquatic environment offers an effective means for many aspects of a participant's exercise and conditioning programme. Aerobic water workouts incorporate a variety of rhythmic body movements and dance step performed in the water. Programs vary from basic to advance. In beginning programs, the participant learns to combine arm and leg movements in varying combinations. As water aerobics programs become more advanced, they incorporate more intricate dance and calisthenics movements [4].

Based upon the physical properties of water, land exercise cannot always be converted into aquatic exercise, because buoyancy rather than gravity is the major force governing movement [5&6]. Physiologic changes incurred by the body while immersed, both at rest and during exercise, will be reviewed.

Water is an equalizing medium; its gravity minimizing nature reduces compressive joint forces, providing a better exercise environment for patients with arthritis, back pain, osteoporosis, or other medical conditions that may restrict physical training on land [7].

The peak Expiratory flow rate (PEFR) indicates the maximum speed at which a person can exhale air from the lungs. The number of movements indicative of inspiration and expiration per unit time is respiratory rate. Exercise increases the number, while rest diminishes it. The lower the resting respiratory rate, healthier the person [8]

Inspiratory Reserve Volume (IRV) refers to the additional amount of air that can be inhaled after a normal inhalation, typically used during deep or forceful breathing. The normal adult is 1900-3300ml. IRV is the Volume of air that can be maximally inhaled beyond a normal Tidal Volume. Inspiratory Reserve Volume is the Volume of air that can be maximally exhaled beyond a normal Tidal Volume.

2. PURPOSE OF THE STUDY

The purpose of the study was to find out the effect of aquatic training on inspiratory reserve volume and expiratory reserve volume among preadolescent boys

3. METHODOLOGY

To achieve the purpose of this study, 30 preadolescent boys were randomly selected as subjects from Thoothukudi District, Tamilnadu, India. Their age ranged from 12 to 14 years. The chosen participants were randomly divided into two groups. Group I had aquatic training (15 people), and Group II was the controller of the Group (15 People). Group 'I' underwent aquatic training for six days in a week and one session per day and each session lasted for 45 minutes for nine weeks. Group 'II' was not exposed to any specific training but they were participated in regular activities. The data on inspiratory and expiratory reserve volume were collected by administering with Wet Spiro meter. The pre and post-test data were collected for the chosen variables before and after the training program. The scores were analysed using the dependent 't' test and Analysis of Covariance (ANCOVA) for each variable separately.

4. ANALYSIS OF THE DATA

The effect of aquatic training on inspiratory reserve volume were analysed and presented below.

4.1 Inspiratory Reserve Volume

Table 4.1

Means and dependent 't'-test for the pre and post tests on inspiratory reserve volume experimental and control groups (in mm³)

Criterion variables	Mean	Experimental Group	Control Group
Inspiratory Reserve Volume	Pre test	1.89	1.86
	Post test	2.05	1.93
	't'test	18.21	0.67

*Significant at .05 level. (Table value required for significance at .05 level for 't'-test with df 14 is 2.145)

The table shows that the pre-test mean value of experimental group and control group on inspiratory reserve volume are 1.89 and 1.86 respectively and the post-test means are 2.05 and 1.93 respectively. From the given dependent t-ratio values between the pre-and post-test means of aquatic training and control group are 18.21 and 0.67 respectively. The table values a required for vital difference with degrees of freedom is 14 at 0.05 level is 2.145. Since the t-value for the experimental group is higher than 2.145, it shows important improvement in inspiratory reserve volume (IRV). Therefore, it is concluded that the aquatic training group had a significant improvement compared to the control group.

4.2 Computation of Analysis of Covariance

The descriptive measures and the results of analysis of covariance on the criterion measures were given in the following tables.

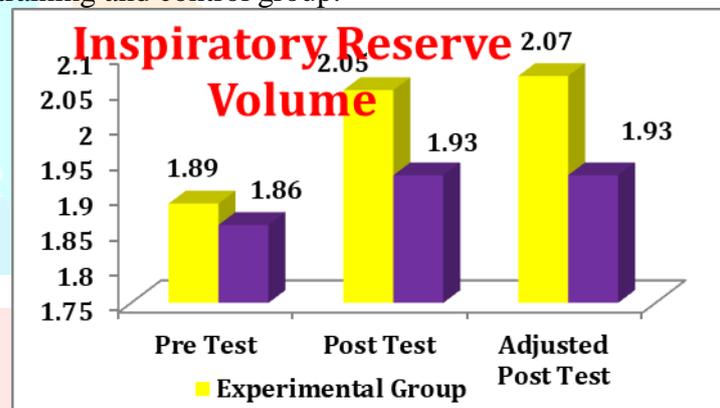
Table 4.2

Computation of mean and analysis of covariance on inspiratory reserve volume of experimental and control groups

Inspiratory Reserve Volume (IRV)	Experimental Group	Control Group	Source of Variance	Sum of Squares	Degrees of Freedom	Mean Square	F
	2.07	1.93	BG	5.25	1	5.25	40.38*
			WG	2.21	27	0.08	

* Significant at 0.05 level. (Table value for degrees of freedom 1, 27 is 4.21)

This table shows that the adjusted post-test means values on inspiratory reserve volume of experimental and control groups 2.07 and 1.93 respectively. The obtained f- ratio of 40.38 for adjusted post-test mean is greater than the table value 4.21 with degrees of freedom 1 and 27 required for significance at 0.05 level of confidence. Representation of both tables gives the result of the study that shows the clear difference between the Inspiratory Reserve volume (IRV) aquatic training group and control group that there was a important mean difference exist between the adjusted post-test scores to the expiratory reserve volume. The below bar diagram represent the mean values of pre-test, post-test and adjusted post-test on expiratory reserve volume of aquatic training and control group.



4.3 Expiratory Reserve Volume

Table 4.3

Means and dependent 't'-test for the pre and post tests on expiratory reserve volume experimental and control groups (in mm³)

Criterion variables	Mean	Experimental Group	Control Group
Expiratory Reserve Volume	Pre test	0.65	0.61
	Post test	0.81	0.67
	't'test	9.43	1.09

*Significant at .05 level. (Table value required for significance at .05 level for 't'-test with degrees of freedom 14 is 2.145)

The table shows that the pre-test mean value of experimental group and control group on expiratory reserve volume are 0.65 and 0.61 respectively and the post-test means are 0.81 and 0.67 respectively. From the dependent t-ratio values between the pre-and post-test means of aquatic training and control group are 9.43 and 1.09 respectively. The table value required for significant difference with degrees of freedom 14 at 0.05 level is 2.145. From the above table the dependent 't'-test values of expiratory reserve volume between the pre and post test means of experimental groups were greater than the table value 2.145 with degrees of freedom 14 at 0.05 level of confidence. It is concluded that experimental group had an important improvement in the expiratory reserve volume compared to control group.

4.4 Computation of Analysis of Covariance

The descriptive measures and the results of analysis of covariance on the criterion measures were given in the following tables.

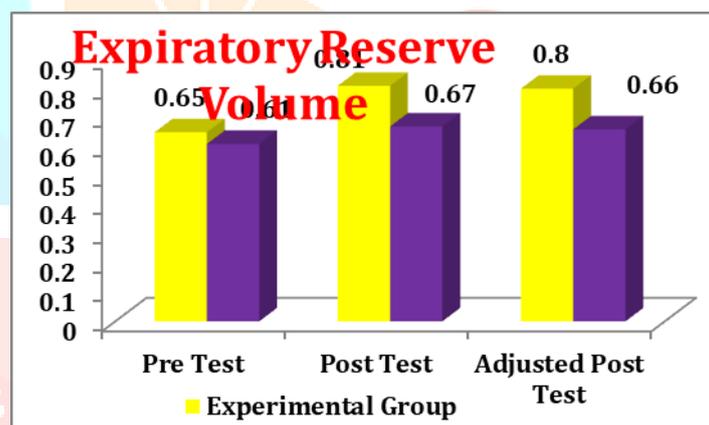
Table 4.4

Computation of mean and analysis of covariance on expiratory reserve volume of experimental and control groups

Expiratory Reserve Volume	Experimental Group	Control Group	Source of Variance	Sum of Squares	Degrees of freedom	Mean Square	F
0.80	0.66	BG	1.01	1	1.01	20.2*	
		WG	0.81	17	0.05		

* Significant at 0.05 level. Table value for degrees of freedom 1, 27 was 4.21

The Table shows that the adjusted post-test means values on expiratory reserve volume of experimental and control groups 0.80 and 0.66 respectively. The obtained f- ratio of 20.2 for adjusted post-test mean is greater than the table value 4.21 with degrees of freedom 1 and 27 required for significance at 0.05 level of confidence. The results of the study shows that there was a clear mean difference exist between the adjusted post-test means of aquatic training and control groups on expiratory reserve volume. The bar diagram represents the mean values of pre-test, post-test and adjusted post-test on expiratory reserve volume of aquatic training and control group.



5. DISCUSSION ON FINDINGS

The result of the study indicates that there was a significant improvement on inspiratory reserve volume and expiratory reserve volume due to the effect of aquatic training among preadolescent boys. They concluded his study effect of aquatic practices improved on Inspiratory reserve volume and expiratory reserve volume among school students

6. CONCLUSIONS

1. It was concluded that the aquatic training group had shown significantly improved inspiratory reserve volume.
2. It was concluded that the aquatic training group had shown significantly improved expiratory reserve volume.
3. However, the control group had not shown any significant improvement on any of the selected variable such as inspiratory reserve volume and expiratory reserve volume.

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