EFFECT OF VARIOUS STRENGTH TRAINING PROGRAMMES ON SELECTED PHYSIOLOGICAL AND PERFORMANCE VARIABLES AMONG MALE ATHLETES

*M. Arunkumar*G & Dr.A.SurendarGG

* Ph.D. Research Scholar, Department of Physical Education, Karpagam University, Coimbatore.

** Associate Professor, Department of Physical Education, A.V.V.M Sri Pushpam College, Poondi.

Arun_mped@yahoo.com

Abstract - The purpose of the study was to find out the effect of various strength training programmes on selected Physiological and performance variables namely Systolic blood pressure, Diastolic blood pressure, Resting heart rate, Breath holding time, 100meter dash among male athletes. To achieve the purpose of the study thirty male athletes have been randomly selected from various 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 athletes and only who those represented their respective college teams were taken as subjects. A series of Physiological variables was carried out on each participant. This included Systolic and Diastolic blood pressure assessed by Sphygmomanometer, Resting heart rate assessed by Digitalized heart rate monitor, Breath holding time assessed by Digital stop watch, performance assessed by 100 meter sprint. The subjects were randomly assigned into two groups of fifteen each, such as experimental and control groups. The experimental group participated in the various strength training programmes 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 various strength training programmes group and control group. And also various strength training programmes group showed significant improvement on Systolic blood pressure, Diastolic blood pressure, Resting heart rate, Breath holding time, 100meter sprint compared to control group.

Key words: strength training, Systolic blood pressure, Diastolic blood pressure, Resting heart rate, Breath holding time

I. Introduction

Weight training is using of resistance over the weight of the body to develop specific areas of body to develop muscular strength and power. It also develops muscular endurance, elasticity and co-ordination. Weight training is the use of systematic exercises with weight and it is used merely as a means to increase resistance of the muscle contraction.

The primary objective is not to learn to lift as much weight as possible, but to increase strength and power for application to some other sports. **(Anderson, 1987)**

Weight training is a common type of strength training for developing the strength and size of skeletal muscles. It uses the force of gravity (in the form of weighted bars, dumbbells or weight stacks) to oppose the force generated by muscle through concentric or eccentric contraction. Weight training uses a variety of specialized equipment to target specific muscle groups and types of movement. Weight training differs from bodybuilding, Olympic weightlifting, power lifting, and strongman, which are sports rather than forms of exercise. Weight training, however, is often part of the athlete's training regimen.

The act of inspiration consists of an enlargement of the thorax with a resultant inrush of air down the trachea and into the lungs in order to equalize the pressures of the air outside the body inside lungs. The act of expiration, on the contrary, is accomplished by a diminution of the thorax, which in turn forces the air out of the lungs. The amount of air, therefore, which is taken in and given out with each act of respiration, under normal conditions, is regulated almost entirely by the extent to which the thorax enlarges itself. The studies on lung parameters have been valued at high rate among sports trainers and coaches. **Clarke (1975)** explains that the trained individual is able to extract a grater proposition of oxygen from air he breathes compared to the untrained person. Resting pulse rate determines the level of cardio-vascular endurance. It has been observed by Johnson and nelson (1998) that resting heart rate is indicative of physical fitness from the stand point that resting heart lowers the result of conditioning. The resting heart rate of a trained individual decreases reflecting a stronger contraction of the heart and more expulsion of blood with each contraction.

Athletics is an exclusive collection of sporting events that involve competitive running, jumping, throwing, and walking. The most common types of athletics competitions are track and field, road running, cross country running, and race walking. The simplicity of the competitions, and the lack of a need for expensive equipment, makes athletics one of the most commonly competed sports in

the world. Athletics is mostly an individual sport, with the exception of relay races and competitions which combine athletes' performances for a team score, such as cross country.

II. Methods and Materials

The purpose of the study was to find out the effect of various strength training programmes on selected Physiological and performance variables namely Systolic blood pressure, Diastolic blood pressure, Resting heart rate, Breath holding time, 100meter dash among male athletes. To achieve the purpose of the study thirty male athletes have been randomly selected from various 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 athletes and only who those represented their respective college teams were taken as subjects. A series of Physiological variables was carried out on each participant. This included Systolic and Diastolic blood pressure assessed by Sphygmomanometer, Resting heart rate assessed by Digitalized heart rate monitor, Breath holding time assessed by Manual nose clip, performance assessed by 100 meter sprint. The subjects were randomly assigned into two groups of fifteen each, such as experimental and control groups. The experimental group participated in the various strength training programmes 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.

TABLE-I

Criterion measures

S.No	Criterion measure	Test items	Unit of measurement
1	Systolic blood pressure	Sphygmomanometer	Mm/hg
2	Diastolic blood pressure	Sphygmomanometer	Mm/hg
3	Resting heart rate	Digitalized heart rate monitor	Beats per minute
4	Breath holding time	Digital stop watch	Seconds
5	100 meter dash	100 meter run	Seconds

TABLE – II

Descriptive analysis of selected Physiological and Performance variables among control and experimental groups

S.No	Variables	Group	Pre-Test Mean	SD (±)	Post –Test Mean	SD (±)	Adjusted Mean
1	Systolic blood pressure	CG	118.47	5.69	110.60	5.17	110.72
		STPG	120.13	6.62	115.73	5.22	115.60
2	Diastolic blood pressure	CG	81.87	6.70	76.33	6.27	76.28
		STPG	83.93	5.40	81.27	4.90	81.31
3	Resting heart rate	CG	75.27	3.93	74.33	3.37	74.37
		STPG	75.40	2.80	71.27	2.93	71.22
4	Breath holding time	CG	44.13	2.09	47.53	2.97	47.56
		STPG	44.60	1.99	49.67	1.50	49.63
5	100 meter dash	CG	6.33	1.34	6.87	1.36	6.87
		STPG	6.47	1.50	8.13	1.06	8.13

STPG= Strength training programme group CG= Control group

The tables-II the pre, post-test means, standard deviations and adjusted means on selected Physiological and performance variables of male athletes were numerical presented. The analysis of covariance on selected variables of strength training programme group and control group is presented in table – III

TABLE – III

Computation of analysis of covariance on selected Physiological and performance variables among male athletes

S. No	variables	Test	Sum of variance	Sum of squares	df	Mean square	F ratio
1	**Systolic blood pressure**	Pre-test	Between groups	20.83	1	20.83	0.54
			Within groups	1067.47	28	38.12	
		Post-test	Between groups	197.63	1	197.63	7.31*
			Within groups	756.53	28	27.01	
		Adjusted means	Between sets	175.18	1	175.18	6.46*
			Within sets	731.84	27	27.10	

2	**Diastolic blood pressure**	Pre-test	Between groups	32.03	1	32.033	0.86
			Within groups	1038.67	28	37.09	
		Post-test	Between groups	182.53	1	182.53	5.75*
			Within groups	888.26	28	31.72	
		Adjusted means	Between sets	184.59	1	184.59	5.62*
			Within sets	885.66	27	32.80	
3	**Resting heart rate**	Pre-test	Between groups	0.13	1	0.13	0.01
			Within groups	326.53	28	11.66	
		Post-test	Between groups	43.20	1	43.20	3.41
			Within groups	354.27	28	12.65	
		Adjusted means	Between sets	74.25	1	74.25	12.42
			Within sets	161.33	27	5.96	
4	**Breath holding time**	Pre-test	Between groups	1.63	1	1.63	0.39
			Within groups	117.33	28	4.19	
		Post-test	Between groups	24.30	1	24.30	4.82*
			Within groups	141.06	28	5.03	
		Adjusted means	Between sets	31.81	1	31.81	5.60*
			Within sets	153.16	27	5.67	
5	**100 meter dash**	Pre-test	Between groups	0.13	1	0.13	0.06
			Within groups	57.06	28	2.03	
		Post-test	Between groups	12.03	1	12.03	8.12*
			Within groups	41.467	28	1.48	
		Adjusted means	Between sets	11.89	1	11.89	7.76*
			Within sets	41.33	27	1.53	

*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)

The obtained F-ratio of 6.46 for adjusted mean was greater than the table value 4.21 for the degree of freedom 1 and 27 required for significance at 0.05 level of confidence. The result of the study indicates that there was a significant

difference among control and experimental groups on Systolic blood pressure. The above table also indicates that pre test of control and experimental groups did not differ significantly and post test of control and experimental groups have significant difference on Systolic blood pressure.

The obtained F-ratio of 5.62 for adjusted mean was greater than the table value 4.21 for the degree of freedom 1 and 27 required for significance at 0.05 level of confidence. The result of the study indicates that there was a significant difference among control and experimental groups on Diastolic blood pressure. The above table also indicates that pre test of control and experimental groups did not differ significantly and post test of control and experimental groups have significant difference on Diastolic blood pressure.

The obtained F-ratio of 12.42 for adjusted mean was greater than the table value 4.21 for the degree of freedom 1 and 27 required for significance at 0.05 level of confidence. The result of the study indicates that there was a significant difference among control and experimental groups on resting heart rate. The above table also indicates that pre test of control and experimental groups did not differ significantly and post test of control and experimental groups have significant difference on resting heart rate.

The obtained F-ratio of 5.60 for adjusted mean was greater than the table value 4.21 for the degree of freedom 1 and 27 required for significance at 0.05 level of confidence. The result of the study indicates that there was a significant difference among control and experimental groups on Breath holding time. The above table also indicates that pre test of control and experimental groups did not differ significantly and post test of control and experimental groups have significant difference on Breath holding time.

The obtained F-ratio of 7.76 for adjusted mean was greater than the table value 4.21 for the degree of freedom 1 and 27 required for significance at 0.05 level of confidence. The result of the study indicates that there was a significant difference among control and experimental groups on 100meters dash. The above table also indicates that pre test of control and experimental groups did not differ significantly and post test of control and experimental groups have significant difference on 100meters dash.

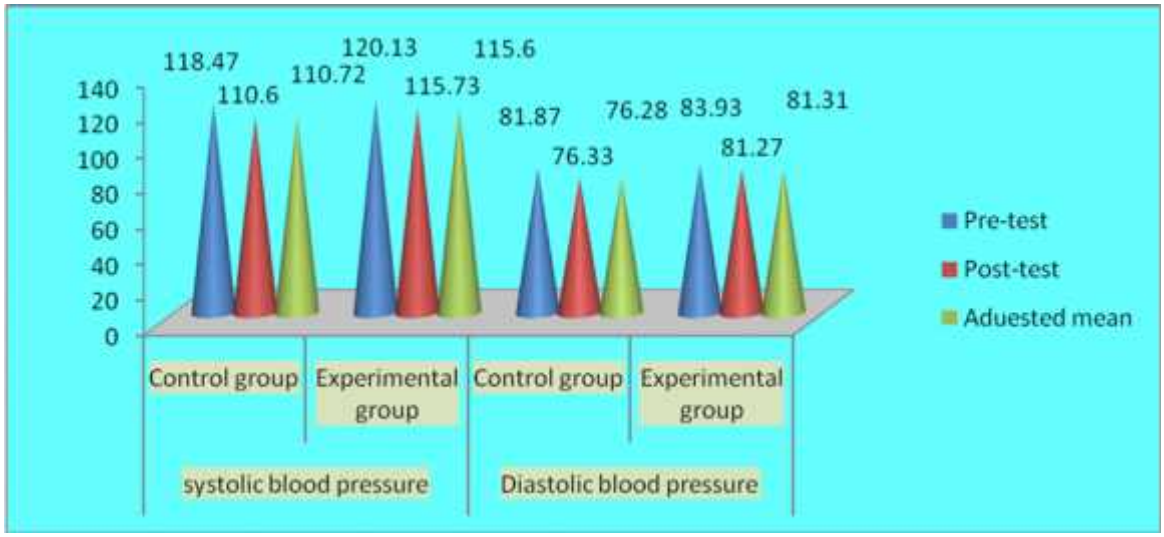

Figure-I The pre, post and adjusted mean values of Systolic blood pressure, Diastolic blood pressure of both control and experimental groups are graphically represented in the figure-I

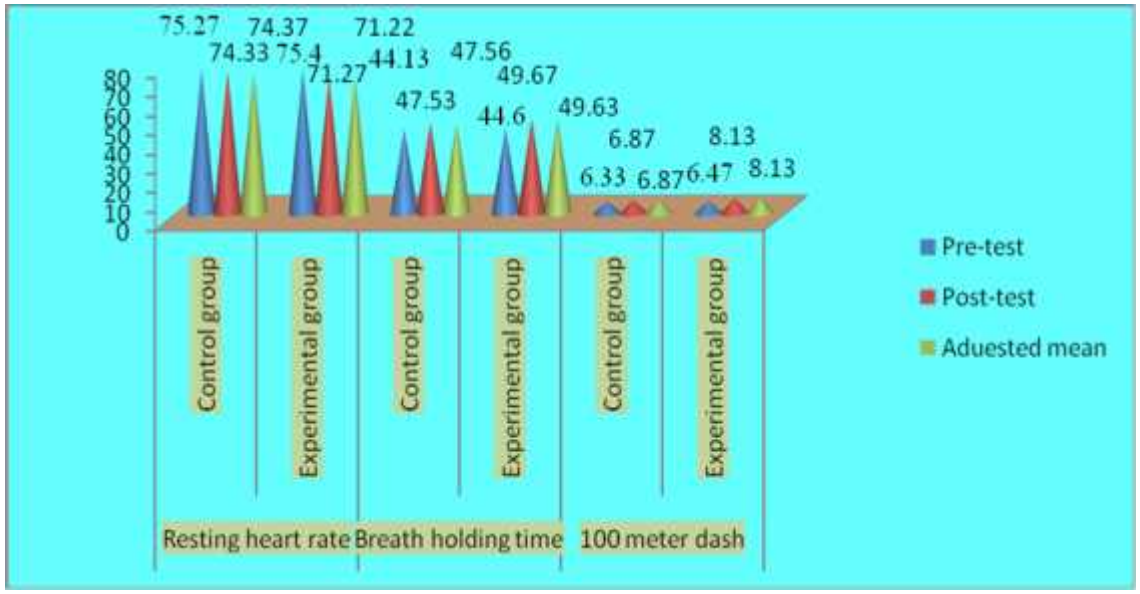

Figure-II The pre, post and adjusted mean values of Resting heart rate, Breath holding time, 100 meter dash of both control and experimental groups are graphically represented in the figure-II.

III. Discussion of findings

The results of the study indicate that the experimental group which underwent strength training programme had showed significant improved in the selected variables namely such as Systolic blood pressure, Diastolic blood pressure,

Resting heart rate, Breath holding time, 100meter dash when compared to the control group. The control did not show significant improvement in any of the selected variables. The past study on selected Physiological and performance variables also reveals Dibble LE, et.al (2006). Kanehisa et.al (2002).

IV. Conclusions

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

1. The experimental group athletes showed significant improvement in all the selected Physiological and performance variables such as Systolic blood pressure, Diastolic blood pressure, Resting heart rate, Breath holding time, and 100meter dash.
2. The control group athletes did not show significant improvement in any of selected variables.

Reference

AhtiainenJP, et. al., "Muscle hypertrophy,hormonal adaptations and strength development during strength training in strength-trained and untrained men."Neuromuscular Research Center and Department of Biology of Physiological Activity, University of Jyväskylä, Eur J Appl Physiol.(2003 Aug);89(6):555-63. Epub 2003 May 7.

Alegre LM, et. al., "Effects of dynamic resistance training on fascicle length and isometric strength."Facultad de CienciasdelDeporte, Universidad de Castilla-La Mancha, Campus tecnológico, Avda. Carlos III s/n, 45071 Toledo, J Sports Sci. (2006 May);24(5):501-8.

Colliander EB, et. al., "Effects of eccentric and concentric muscle actions in resistance training."Department of Environmental Medicine, Karolinska Institute, Stockholm, Sweden.ActaPhysiol Scand. (1990 Sep); 140(1):31-9.

Colson SS, et. al., "Effects of electromyostimulation versus voluntary isometric training on elbow flexor muscle strength."Laboratory of Physiological Adaptations, Motor Performance and Health (EA 3837), University of Nice-Sophia Antipolis, Faculty of Sport Sciences, B.P. 32 59, F 06205 Nice Cedex 03, .J Electromyography Kinesiol. (2009 Oct); 19(5):e311-9.

Cormie P, et. al., "Power versus strength-power jump squat training: influence on the load-power relationship."Neuromuscular Laboratory, Department of Health, Leisure and Exercise Science, Appalachian State University, Boone, NC 28607, USA. Med Sci Sports Exerc. (2007 Jun);39(6):996-1003.

Folland JP, et. al., "Strength training: isometric training at a range of joint angles versus dynamic training."School of Sport and Exercise Sciences, Loughborough University, Loughborough, J Sports Sci. (2005 Aug);23(8):817-24.

Gergley JC, et. Al., "Comparison of two lower-body modes of endurance training on lower-body strength development while concurrently training."Department of Kinesiology & Health Science, Stephen F Austin State University, Nacogdoches, J Strength Cond Res. (2009 May);23(3):979-87.

Graves JE, et. el., "Effect of training frequency and specificity on isometric lumbar extension strength."Center for Exercise Science, College of Medicine, Gainsville, Florida.Spine (Phila Pa 1976). (1990 Jun); 15(6):504-9.

Judge LW, .et. al., "Efficacy of potentiation of performance through overweight implement throws on male and female high-school weight throwers."School of Physical Education, Sport, and Exercise Science, Ball State University, Muncie, Indiana, J Strength Cond Res. (2010 Jul);24(7):1804-9.

Mayhew JL, .et. al., "Changes in upper body power following heavy-resistance strength training in college men."Human Performance Laboratory, Truman State University, Kirksville, Missouri 63501, USA.Int J Sports Med. (1997 Oct);18(7):516-20.

Mayhew JL, et. al., "Changes in upper body power following heavy-resistance strength training in college men."Human Performance Laboratory, Truman State University, Kirksville, Missouri 63501, USA.Int J Sports Med. (1997 Oct);18(7):516-20.

Tanimoto M, et.al. "Effects of whole-body low-intensity resistance training with slow movement and tonic force generation on muscular size and strength in young men."Division of Health Promotion and Exercise, National Institute of Health and Nutrition, J Strength

Cond Res. (2008 Nov);22(6):1926-38.

Singh,H. (1991). Science of sports training. DVS Publications, New Delhi

Robert, W.Anderson, The effect of weight training on total body reaction time unpublished master thesis, university of Illinois (1987) p.66

http://en.wikipedia.org/wiki/Wikipedia