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Effect Of Selected Yogic, Aerobic And Laughter Exercises On Blood Pressure Of High School Boys

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ABSTRACT

Blood pressure is the pressure by which the blood is circulated in the blood vessels of our body. The heart which is a muscular pump supplies the pressure to move the blood and also circulate the blood throughout the body. Systolic and diastolic arterial blood pressures are not static but undergo natural variations from one heartbeat to another and throughout the day, it increases during physical exercises, walking, drugs, disease, mental stress and also sexual activity and decreases when the body is at rest during sleep.

The average normal blood pressure in the brachial artery, which is the next direct artery from the aorta, is 120mmHg/80mmHg. Blood pressure readings are measured in millimeters of mercury (mmHg) using sphygmomanometer. Two pressures are measured and recorded namely as systolic and diastolic pressures. Systolic pressure reading is the first reading which represents the maximum exerted pressure on the vessels when the heart contracts, while the diastolic pressure the second reading represents the minimum pressure in the vessels when the heart relaxes.

The purpose of this study is to know the effect of Yogic, Aerobic and Laughter exercises on Blood Pressure of High School Boys. For this study 14 to 15 years 8th and 9th standard 120 School boys were selected. The test was conducted with the help and guidance of physician. The birth dates of the subject's were collected from the school admission records. The exact present age of each subject from the date of test was converted into decimal age. Further they were divided in to four groups with 30 subjects in each group, such as Yogic, Aerobic, Laughter and Control group. Pre-test was conducted for all the groups before training. After completion of eight weeks training post-test was conducted to determine the cause and effect of training. Hence the difference between mean of four groups in the pre-test have to be taken into account during the analysis of post-test difference between the mean. This was achieved by the application of analysis of co-variance, where the final mean were adjusted for difference in the initial means and the adjusted means were tested for significance. When the adjusted post-test means were significant at 0.05 levels, the Bonferroni's post-hoc test was administered to find out the paired means significant difference. The study proved that blood pressure was significantly reduced in experimental group when compared to control group.

Keywords : Yoga, Aerobic, Laughter Exercise, School

Introduction

The theoretical knowledge of science is made practical and useful in the form of new machinery, gadgets and appliances to reduce human labour and help man towards a more comfortable and enjoyable life. Physical activity engaged in as a child can encourage fitness throughout the lifespan. Well designed physical activities can effect on children by decreasing health problems. The body uses more calories efficiently by helping in maintenance of health. It can also increase basal metabolic rate and helps to reduce body fat. Thus there is an urgent need to bring about positive changes in the present day lifestyles by participating in yoga, aerobic and fitness programmes.

Modern metropolitan life is fast paced, leading a hurried life

and they have very little time for leisure and entertainment is one of the major risk factors for diseases. However exercise helps to improve health and can even reverse some heart disease risk factors. Like all muscles the heart becomes stronger as a result of exercise, so it can pump more blood through the body with every beat and continue working at maximum level with less strain. A person who exercises often and vigorously has the lowest risk for heart disease, but any amount of exercise is beneficial. Studies consistently find that light-to-moderate exercise is even beneficial in people with existing heart disease. Studies continue to show that physical activity and avoiding high-fat foods are the two most successful means of reaching and maintaining heart-healthy levels of fitness and weight. The American Heart Association recommends that individuals perform moderately-intense exercise for at least 30 minutes on most days of the week.

The heart is a large muscular organ that pumps blood throughout the body. The valves inside the heart open and close this controls how much blood enters the heart. Oxygen rich blood enters the heart from the lungs and goes out to the body. Oxygen poor blood enters the heart from the body and goes out to the lungs. The human circulatory system is 60,000 miles long and the magnitude of blood pressure is not uniform in all the blood vessels in the human body. The blood pressure is determined by the diameter, flexibility and the amount of blood being pumped through the blood vessel. There is some relationship between dietary salt intake and increased blood volume potentially resulting in higher arterial pressure. By participating in yoga and physical activities can definitely control blood pressure

Yoga is a postural pattern, these postural patterns are to be achieved slowly, maintained for some time steadily and released again in a slow and smooth manner. Yoga associated healthy live lifestyle with balanced approach to life and brings stability to the wavering mind. It is the only form of physical activity that provides complete exercise to the body. Because it massages all the internal organs and glands, this in turn reduces the risk of many diseases. Pranayama are the best exercises to increase the lungs capacity and positive effects on the mind. Yoga is a medication without the actual use of medicine. No visible side effects are associated with the practice of yoga on regular basis.

Aerobic is a physical activity using the large muscle group rhythmically for an extended period of time, while maintaining 60 to 80 percent of maximum heart rate and increase oxygen intake. Aerobic is defined as continuous movement of exercise, locomotors movement and dance steps performed to music. The variety and style of movements for the musical accompaniment provides as many forms of aerobic dance programme as there are interest and tastes of people performing them.

Laughter is a part of human behaviour regulated by the brain. It helps to relieve pain through the release of endorphin and drops the level of stress hormones. Laughter is a technique for cure without drugs and a balm for ailments caused by modern stressful lifestyles. Laughter exercise is not a new idea in ancient scriptures we find references of hasya yoga as a cure for several diseases. Laughter yoga was developed by Dr. Madan Kataria, after some research he learnt that fake laughing or laughing for no reason produced similar benefits as real laughter and introduced this to the laughter club.

The blood pressure reading for children is somewhat complicated compared to adults. While adult blood pressure readings can easily be compared to simple published values for what is considered to be normal and abnormal, such easy comparisons aren't possible for children, because children's bodies change so quickly early in life. Some of the factors such as poor diet, lack of physical activity and higher intake of salt, low birth weight, which is a reflection of poor in-vitro nutrition, would be partly responsible for higher blood pressure in children.

Regular exercise helps to keep arteries elastic, which in turn ensures blood flow and normal blood pressure. Doctors recommend at least 30 minutes of exercise on most days. Stress reduction may help blood pressure control. Yoga, laughing, aerobic and relaxation techniques may be beneficial to control blood pressure.

Administration of Test: The method of the test was explained to the subjects before the test and all sorts of efforts were made to ensure accuracy and uniformity in administration of the test.

Purpose: To measure the systolic and diastolic blood pressure.

Equipment: The standardized stethoscope and sphygmomanometer.

Procedure: The subjects were seated at rest at least for 10 minutes prior to measurements, and they were asked to lay supine position on the bed and relax. The measurements were carried out with the help of the physician using a standard mercury sphygmomanometer. Readings were taken on the

right arm. An inflatable cuff placed around the subject's upper arm at the same vertical height as the heart, attached to a mercury manometer, by repeatedly squeezing a rubber bulb until the artery is completely occluded. Listening with the stethoscope to the brachial artery at the elbow, the examiner slowly releases the pressure in the cuff. When blood just starts to flow in the artery, the turbulent flow creates pounding (Korotkoff) sound. The pressure at which the sound was first heard is the systolic blood pressure. The cuff pressure was further released until no sound can be heard was the diastolic blood pressure. Blood pressure was measured three times, about 5 minutes apart. The average of all three readings was the individual's blood pressure.

Scoring: The mercury manometer is considered to be the gold standard for arterial pressure measurement. As the heart beat, the highest pressure in this cycle (systolic blood pressure) is recorded. Between beats, the lowest pressure (diastolic blood pressure) is recorded. A measurement at the height of a column of mercury was the absolute result. The systolic number is always started first and the diastolic number is listed second. For example: 122/76 (122 over 76); systolic = 122, diastolic = 76. The blood pressure is measured in millimetre of mercury, which is abbreviated mm Hg.

The Still Pictures of Measuring Blood Pressure



Methodology

- For this study 120 subjects were selected randomly and divided in to yogic, aerobic, laughter and control group.
- The age of the subjects is 14 to 15 years.
- Before training pre-test were conducted for all the groups.
- The experimental group were underwent yogic, aerobic and laughter exercise training for the duration of 45 minutes a day, 5 days a week and a period of 8 weeks.
- The control group did not undergo any training.
- After completion of eight weeks training, all the subjects were re-tested to collect post-test data to determine the cause and effect of training on selected variables.

The list of exercises and training schedule for yogic, aerobic and laughter exercises are given in details in table A.B.C.

Table A: The Training Schedule for Selected Yogic Exercises

List of Asanas	Week	Training Load Dynamics	Number of Repetitions
Suryanamaskara: Relax With Shavasana Standing posture: Thadasana, Ardakati chakrasana, Trikonasana, Vrikksasana, Relax With Shavasana Sitting posture : Padmasana, Parvathasana, Ushtrasana, Janusirasana, Vajrasana, Relax with Shavasana Prone Posture : Bhujangasana, Dhanurasana, Shalabhasana, Relax with Makarasana Supine Posture : Sarvangasana, Halasana, Mastyasana, Chakrasana, Relax with Shavasana Pranayama: Bramari, Omkar (A.U.M) Relax With Shavasana	1	Medium	2
	2	Considerable	3
	3	Optimum	5
	4	Optimum	5
	5	Considerable	3
	6	Sub maximum	4
	7	Sub maximum	4
	8	Medium	2

Table B : The List of Selected Aerobic Exercises and Training Schedule

List of Aerobics Exercises	week	Training Load Dynamics	Number of Repetitions
Common exercises include hands forward and sideward's, alternate knee lifts, leg lift single leg stretch, single straight leg stretch and both leg stretch, single leg kicks, side leg kicks, sidekicks up and down, side kick small circles, walk out and walk back with clap, trunk circle, chest expansion, squat straddle jump, lunges, step up step down, moving forward sideward, jumping jack, jumping jack squat, circle hop turning towards right full circle leg kick, grapevines, pushups, reverse pushups, calisthenics and various dance movements. Warming up and cool down: The aerobic training programme was starts with a minimum five minutes of warming up with a variety of exercises and at the end of each day training a systematic cool down exercises was followed.	1	Medium	2
	2	Considerable	3
	3	Optimum	5
	4	Optimum	5
	5	Considerable	3
	6	Sub maximum	4
	7	Sub maximum	4
	8	Medium	2

Table C : The Training Schedule for Selected Laughter Exercises

List of Laughter Exercises	week	Training Load Dynamics	Number of Repetitions
Greeting Laughter, Hearty Laughter	1	Medium	2
One-meter Laughter, Milkshake Laughter	2	Considerable	3
Cell Phone Laughter, Lion Laughter	3	Optimum	5
Silent Laughter (without sound)	4	Optimum	5
Humming Laughter (with mouth closed)	5	considerable	3
Argument Laughter, Appreciation Laughter	6	Sub maximum	4
Forgiveness/Apology Laughter, Gradient Laughter	7	Sub maximum	4
Kannada Alphabetical Laughter, Dancing Laughter	8	Medium	2
Heart to Heart Laughter (intimacy laughter) Warming up and Cool down Laughing training programme starts with a variety of warming up exercises for a minimum of five minutes. Similarly at the end of each days training was concluded with appropriate cool down programme.			

Table 1 : Descriptive Statistics of Systolic Blood Pressure for Four Groups (Measured values in mmHg)

Group	Tests	Min	Max	Mean	Std. Error (mean)	Std. Dev
Yogic	Pre	110.00	130.00	115.13	0.99	5.40
	Post	108.00	120.00	112.33	0.79	4.30
Aerobic	Pre	110.00	130.00	115.13	0.99	5.40
	Post	108.00	120.00	112.47	0.78	4.29
Laughter	Pre	110.00	130.00	115.13	0.99	5.40
	Post	108.00	120.00	112.60	0.78	4.27
Control	Pre	110.00	130.00	115.13	0.99	5.40
	Post	110.00	130.00	116.93	0.78	5.60

The table -1 reveals that, descriptive statistics like minimum (min), maximum (max), mean, standard error (Std. Error) of

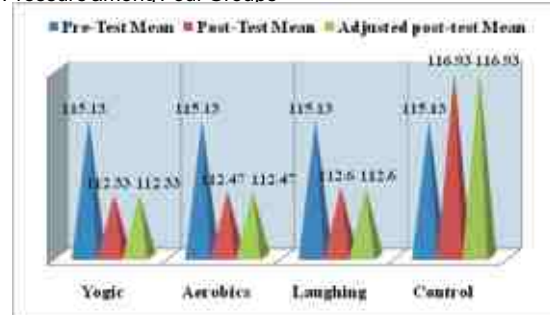
mean, and standard deviation (Std. Deviation) to make statistical observations of systolic blood pressure for four groups. The minimum (min) systolic blood pressure in post-test is less in the experimental group and is equal in control group when compared with the minimum (min) systolic blood pressure in respective groups of pre-test. The maximum (max) systolic blood pressure in post-test is also less in experimental group and is equal in control group when compared with the systolic blood pressure in respective group of pre-test. Further the Std. Error (of mean) is also less in the post-test when compared to the pre-test in the respective groups. Similarly the Std. Deviation in post-test is lesser than the pre-test in experimental group and marginal increase in control group.

Table 2 : Mean Scores of Systolic Blood Pressure for Four Groups

Group	Pre-Test Mean	Post-Test Mean	Adjusted post-test Mean (for pre-test)
Yogic	115.13	112.33	112.33
Aerobic	115.13	112.47	112.47
Laughter	115.13	112.60	112.60
Control	115.13	116.93	116.93

The table -2 explains the pre, post and adjusted (for pre-test) mean of Systolic Blood Pressure among the experimental group and control group. The pre-test mean for systolic blood pressure is 115.13, in yogic group, 115.13, in aerobic group, 115.13, in laughter group, and 115.13, in control group. The post-test mean for systolic blood pressure is 112.33, in yogic group, 112.47, in aerobic group, 112.60, in laughter group, and 116.93 in control group. The adjusted (for pre test) mean for systolic blood pressure is 112.33, in yogic group, 112.47, in aerobic group, 112.60, in laughter group, and 116.93 in control group.

Figure 1 : Multiple Pyramid plots of Mean Systolic Blood Pressure among Four Groups



The mean scores in the table -2 are represented graphically in the multiple bar plot figure -1. The multiple bar plot denotes that, there is a decrease in adjusted (for pre-test) post-test mean systolic blood pressure when compared with pre-test mean systolic blood pressure in the experimental group. Whereas, in control group the adjusted mean systolic blood pressure is marginal increase when compared to pre-test mean.

Table 3 : Analysis of Covariance for Systolic Blood Pressure among Four Groups

Source of variance	Sum of Squares	df	Mean Square	F- ratio	p-value
Pre-Systolic Blood Pressure	2012.24	1.00	2012.24	465.65*	0.00
Between Groups	449.97	3.00	149.99	34.71*	0.00
With in Groups (Error)	496.96	115.00	4.32	-	-

* indicates significant (<0.05)

The results in the table -3 indicates that, there is significant mean effect (p-value<0.05) for treatment, i.e., post-test systolic blood pressure differs significantly in experimental group. It also showed a significant relationship between pre and post-test systolic blood pressure. When pre-test systolic blood pressure is statistically controlled, the treatment has influenced on post-test systolic blood pressure. Since the effect of treatment was significant, Post hoc test was employed to find out the source of the significance. The results are shown in the table 4.

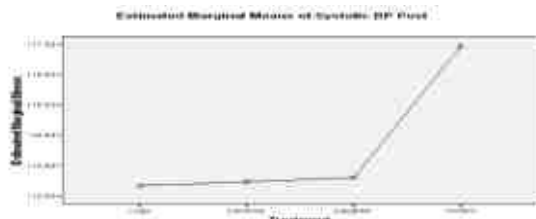
Table 4 : Post Hoc Test Mean Difference of Systolic Blood Pressure between Four Groups

Group				Mean Difference	p-value	95% confidence Interval for Difference	
Yogic	Aerobic	Laughter	Control			Lower Bound	Upper Bound
112.33	112.47			-0.13	1.00	-1.57	1.31
112.33		112.60		-0.27	1.00	-1.71	1.17
112.33			116.93	-4.60*	0.00	-6.04	-3.16
	112.47	112.60		-0.13	1.00	-1.57	1.31
	112.47		116.93	-4.47*	0.00	-5.91	-3.03
		112.60	116.93	-4.33*	0.00	-5.77	-2.89

* indicates significant (<0.05)

The table -4 reveals that, there is no significant difference in adjusted post test mean of systolic blood pressure among the experimental group. Further there is a significant difference in the mean of systolic blood pressure, when the experimental groups are compared with the control group.

Figure 2 : Profile Plot of Estimated Marginal Mean For Systolic Blood Pressure for Four Groups



The profile plot figure -2 depicts that, the systolic blood pressure is diminishing in post-test experimental group when compared to the control group. Whereas no significant difference with in the experimental group.

Table 5 : Descriptive Statistics of Diastolic Blood Pressure for Four Groups (Measured values in mmHg)

Group	Tests	Min	Max	Mean	Std. Error (mean)	Std. Dev
Yogic	Pre	70.00	80.00	73.93	0.73	3.98
	Post	66.00	74.00	69.67	0.38	2.11
Aerobic	Pre	70.00	80.00	74.00	0.72	3.93
	Post	66.00	78.00	70.67	0.54	2.94
Laughter	Pre	70.00	80.00	74.07	0.71	3.88
	Post	68.00	80.00	71.13	0.61	3.35
Control	Pre	70.00	80.00	73.87	0.70	3.86
	Post	70.00	84.00	74.93	0.80	4.35

The table-5 reveals that, descriptive statistics like minimum (min), maximum (max), mean, standard error (Std. Error) of mean, and standard deviation (Std. Deviation) to make observations of diastolic blood pressure for four groups. The minimum (min) diastolic blood pressure in post-test is less in the experimental group and equal in control group, when compared with minimum (min) diastolic blood pressure in respective groups of pre-test. The maximum (max) diastolic blood pressure in post-test is less in yogic and aerobics group and is equal in laughter group and it increase in control group when compared with max diastolic blood pressure in respective groups of pre-test. Further the Std. Error (of mean) is also less in post-test when compared to pre-test in experimental group, where as in control group it is elevated. Similarly the Std. Deviation in the post-test is less than the pre-test in experimental group and slightly more in control group.

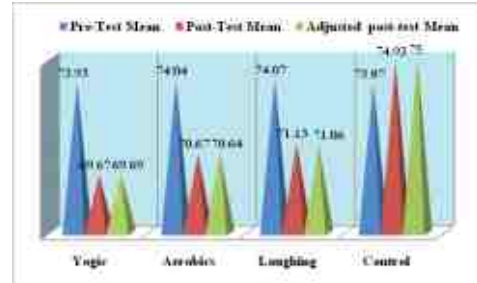
Table - 6 : Mean Scores of Diastolic Blood Pressure for Four Groups

Group	Pre-Test Mean	Post-Test Mean	Adjusted post-test Mean
Yogic	73.93	69.67	69.69
Aerobic	74.00	70.67	70.64
Laughter	74.07	71.13	71.06
Control	73.87	74.93	75.00

The table -6 describes the adjusted (for pre-test) mean of diastolic blood pressure among the experimental group and control group. The pre-test mean for diastolic blood pressure is 73.93, in yogic group, 74.00, in aerobic group, 74.07, in

laughter group, and 73.87, in control group. The post-test mean for diastolic blood pressure is 69.67, in yogic group, 70.67, in aerobic group, 71.13, in laughter and 74.93, in control group. The adjusted (for pre-test) mean for diastolic blood pressure is 69.69, in yogic group, 70.64, in aerobic group, 71.06, in laughter and 75.00, in control group.

Figure 3 : Multiple Pyramid plots of Mean Diastolic Blood Pressure among Four Groups



The mean scores in the table -6 are represented graphically in multiple bar plot figure -3. The multiple bar plot signifies that, there is an decrease in adjusted (for pre-test) post-test mean diastolic blood pressure, when compared with pre-test mean diastolic blood pressure in experimental group and vaguely high in control group.

Table 7 : Analysis of Covariance for Diastolic Blood Pressure among Four Groups

Source of variance	Sum of Squares	df	Mean Square	F-ratio	p-value
Pre-Diastolic Blood Pressure	861.69	1	861.69	252.17*	0.00
Between Groups	492.88	3	164.29	48.08*	0.00
With in Groups (Error)	392.98	115	3.42	-	-

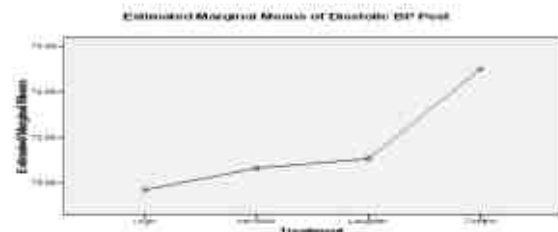
* indicates significant (<0.05)

The table -7 indicates that, there is significant mean effect (p-value<0.05) for treatment, i.e., post-test diastolic blood pressure differs significantly in experimental group and also a significant relationship between pre and post-test diastolic blood pressure. When pre-test diastolic blood pressure is statistically controlled, the treatment has influence on post-test diastolic blood pressure. Since the effect of treatment was significant, Post hoc test was employed to find out the source of the significance. The results are as shown in the table -8.

Table 8 : Post-Hoc Test Mean Difference of Diastolic Blood Pressure between Four Groups

Group				Mean Difference	p-value	95% confidence Interval for Difference	
Yogic	Aerobic	Laughter	Control			Lower Bound	Upper Bound
69.69	70.64			-0.95	0.29	-2.24	0.33
69.69		71.06		-1.37*	0.03	-2.66	-0.09
69.69			75.00	-5.31*	0.00	-6.60	-4.03
	70.64	71.06		-0.42	1.00	-1.70	0.86
	70.64		75.00	-4.36*	0.00	-5.64	-3.08
		71.06	75.00	-3.94*	0.00	-5.21	-2.66

Figure 4 : Profile Plot of Estimated Marginal Mean for Diastolic Blood Pressure for Four Groups



The profile plot in the figure -4 describes the decrease in post-test diastolic blood pressure within the experimental group, when compared to the control group. Further it reveals that, the decrease of diastolic blood pressure in yogic group is greater than laughter group.

Discussion of Findings:

The blood pressure was significantly improved in experimental group when compared with control group in pre and post-test outcomes due to the influence of eight weeks training. The results have been shown in tables 1, 2,3,4,5,6,7,8 and figures 1,2,3,4. The findings discovered the following results between yogic, aerobic and laughter groups.

Yogic: The blood pressure (systolic and diastolic) was improved in yogic group compared to control group due to the influence of eight weeks of yogic practice. Because yogic exercises are a slow movement activities, that develop body posture and flexibility. Yoga and pranayama boosts circulation of blood and improve functioning of the entire circulatory system, it develops cardio-respiratory efficiency and normalizes blood pressure. It's a good sense of relaxation. The British Journal "The Lancet", which showed the effects of the Shavasana (Corpse Pose) with simply lying on the couch. After three months, Shavasana was responsible for a 26 point drop in Systolic blood pressure (top number), and a 15 point drop in the diastolic blood pressure (bottom number).

Aerobic: The blood pressure has showed a considerable improvement in aerobic group due to the influence of eight weeks of aerobic exercises. Because aerobic is the continuous movement exercise, it increases strength, stamina, agility, flexibility, balance and coordination and reduces body weight and body fat, that improves the blood circulation efficiency and reduces blood pressure. The aerobic exercise enlarges the respiratory muscles and increase total number of red blood cells in the body to facilitate transport of oxygen.

Laughter: The blood pressure has showed a momentous decrease in laughter group due to the influence of eight weeks of laughter exercises. Laughter exercises helps to tone up the circulatory system of the body which in turn results in strengthening the circulatory system and improve blood pressure. It provides a good massage to all the internal organs and enhances the efficiency of blood supply and tone up the muscles of the face. When you laugh your face become red due to an increase in blood supply with nourishes the facial skin and makes it glow, laughing people looks more cheerful and attractive. Recent surveys indicate that laughter can enhance the quality of our conversations and productivity. It makes people feel closer to each other.

Further it is justified that, the influences of exercises or any type of sports and games do not find room for disturbing systolic and diastolic blood pressure levels of children up to the age of 10 to 16 years. Generally in the entire phase of children growth and development, any type of voluntary or involuntary physical activates performed by them certainly enable to use surplus energy generated and stored in a regular process of development of whole body, rather than disturbing in different functions of the body. Many studies conducted on children of 10 to 15 years of age have unanimously concluded that blood pressure control in children is to be unimodal with almost symmetrical distribution of blood.

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