

Effect of Hatha Yoga and Aerobic Dance Practice on Selected Resting Heart Rate and Pre-exercise Heart Rate of Adolescent Girls

Dr. Sanjoy Mitra¹, Dr. Susanta Jana²

ABSTRACT

Yoga is an ancient Indian Philosophy. The purpose of the study was to evaluate acute physiological response, to find out the changes if any in resting heart rate and pre exercise heart rate, following the Yoga and aerobic dance practices. The total subjects were 120 divided into four groups and their age ranges from 12-16 years. The duration of total practice period were 6 weeks (3 days in a week for 30 minutes). Pre test and post test data were analyzed by paired 't' test method. For obtaining the significant differences ANCOVA method was adopted. (Garrett, 1981). The organised Yoga and aerobic dance programme definitely improved their performance in selected resting heart rate and pre-exercise heart rate.

KEY WORDS

Yoga, Aerobic dance, Resting Heart Rate, Pre-exercise Heart Rate.

INTRODUCTION

Yoga has a great antiquity, long tradition and is a result of thousands of years of careful and systematic exploration for a long time by the sages and yogis, on the basis of their meticulous observations and personal experiences. Yoga is an art, a science, a philosophy, a culture and, to a few, a religion, all in unison. Any reference to yoga must symbolize the integrated whole and not any part of it. How this unification of art with

science, of philosophy with culture, and of both these with the yoga way of life was achieved by hatha yoga deserves emphasis because of its significance to woman. It is a science of life which helps man to attain their highest potential and highest state of consciousness. It uses various physiological techniques involving asanas, Pranayamas etc.

The origin of hatha yoga developed in India. In Sanskrit, 'Ha' means 'Sun' and 'Tha' means Moon. 'Hatha' means 'forceful'

1. Asst. Teacher, Rabindra Vidyapith High School, Santipur, Nadia, W. B.

2. Bathauberia Srinibash Vidyamandir (H. S.), Purba Medinipur, W. B.

implying that powerful work must be done to purify the body. Yoga means to yoke, or to join two things together; hence, hatha yoga is meant to join together sun (masculine, active) energy with the moon (feminine, receptive) energy, thus producing balance and greater power in an individual. It is the branch of yoga which concentrates on physical health and mental well being. Hatha yoga uses bodily postures (asanas) with the goal of bringing about a sound healthy body and clear, peaceful mind.

Aerobic exercise, such as aerobic dance, is a fun way to get fit. Aerobic dance is a popular exercise in adolescent pupil. Aerobic exercise describes any type of exercise, typically performed at moderate levels of intensity for extended period of time that increases the heart rate. The typically aerobics class usually begins with a warm up phase, which generally uses movements with a low to moderate speed and range of motion. This section is mainly designed to promote body awareness, raise the core temperature of the body and to increase blood flow to the muscles.

In this article, an attempt has been made to observe the improvement that occurs in selected resting heart rate and pre-exercise heart rate, following aerobic and yoga practices among the adolescent girls.

Purpose of the Study

The purpose of the study was as follows :

- i) To observe the impact of hatha yoga and

aerobic dance practice of adolescent girls.

- ii) To find out the changes, if any, in physiological response in resting heart rate and pre-exercise heart rate following the yoga and aerobic dance practices.

METHODOLOGY

The total subjects were one hundred and twenty (120), selected from Rabindra Vidyapith High School, Santipur, Nadia, West Bengal; and age ranging from 12-16 years. All the subjects possessed sound physique. All the subjects were divided into four groups, i.e., hatha yoga, aerobic dance, combined and control groups.

a) Practice Schedule

The total period of study was 6 weeks and each group practiced three days in a week; and duration was 30 minutes which supervised exercise programme for experimental subjects; and the control group continued usual activity. The subjects practiced the asanas and pranayamas.

Yoga Group

The yoga group practiced Tadasana, Tratoch, Kati Chakrasana, Surya Namaskar, Sarbangasana Halasana, Paschimothanasana and Pranayams were Nadi Sodhana, Kapalbhathi, Bhamari, Yoga-Nidra.

Aerobic Dance Group

The Practiced aerobic dance with music.

Combined Group

- The Practiced yoga, 15 min. / day, and aerobic 15 min. / day, approximately.

Control Group

The control group subjects continued usual activity.

b) Criteria Measured

The personal data age, height, weight

were measured by school record, stadiometer, weighing machine, respectively. On the other hand selected physiological parameters such as resting heart rate and pre-exercise heart rate were measured by stopwatch.

RESULTS & DISCUSSION

Table - 1(a) : Pre-test : (Mean, SD) of Yoga, Aerobic Dance, Combined and Control Group Variables

	Yoga Gr. (Mean \pm SD)	Aerobic Dance Gr. (Mean \pm SD)	Combined Gr. (Mean \pm SD)	Control Gr. (Mean \pm SD)
Personal Data				
Age	13.77 \pm 1.25	13.8 \pm 0.81	14.67 \pm 0.99	14.90 \pm 0.92
Height	141.70 \pm 6.10	149.37 \pm 4.43	151.37 \pm 9.08	150.30 \pm 8.54
Weight	38.67 \pm 5.96	42.23 \pm 1.72	42.70 \pm 7.00	40.77 \pm 5.16
Physiological Variables				
Resting Heart Rate	64.07 \pm 3.58	62.57 \pm 3.15	62.93 \pm 3.10	62.10 \pm 2.81
Pre Exercise Heart Rate	81.17 \pm 8.23	81.90 \pm 4.99	76.77 \pm 4.17	78.93 \pm 5.27

Table - 1(b) : Post-test : (Mean, SD) of Yoga, Aerobic Dance, Combined and Control Group Variables

	Yoga Gr. (Mean \pm SD)	Aerobic Dance Gr. (Mean \pm SD)	Combined Gr. (Mean \pm SD)	Control Gr. (Mean \pm SD)
Personal Data				
Weight	37.13 \pm 5.48	40.20 \pm 4.24	41.70 \pm 6.22	41.33 \pm 5.40
Physiological Variables				
Resting Heart Rate	61.97 \pm 4.54	60.17 \pm 3.00	61.53 \pm 4.15	62.57 \pm 2.81
Pre Exercise Heart Rate	77.90 \pm 7.06	77.23 \pm 4.78	73.37 \pm 4.08	78.77 \pm 5.24

Personal Criteria

The age, height and weight of the subjects was considered as personal variable.

Age

Mean scores and standard deviation of four groups of age were 13.77 ± 1.25 , 13.8 ± 0.81 , 14.67 ± 0.99 and 14.90 ± 0.92 years, respectively as shown in Table 1(a).

Height

Mean scores and standard deviation of four groups of height were 141.70 ± 6.10 , 149.37 ± 4.43 , 151.37 ± 9.08 and $150.30 \pm$

8.54 cm, respectively as shown in Table-1(a).

Weight

Mean scores and standard deviation of four groups of weight, in pre-test, were 38.67 ± 5.96 , 42.23 ± 4.72 , 42.70 ± 7.00 and 40.77 ± 5.16 kg, respectively, as shown in Table-1(a) and Fig. 1. Post test weights, mean and SD were 37.13 ± 5.48 , 40.20 ± 4.24 , 41.70 ± 6.22 and 41.33 ± 5.40 kg, respectively, as shown in Table No. 1(b) and Fig. 1. After completion of the training programme, mean scores of weight of all experimental groups decreased slightly.

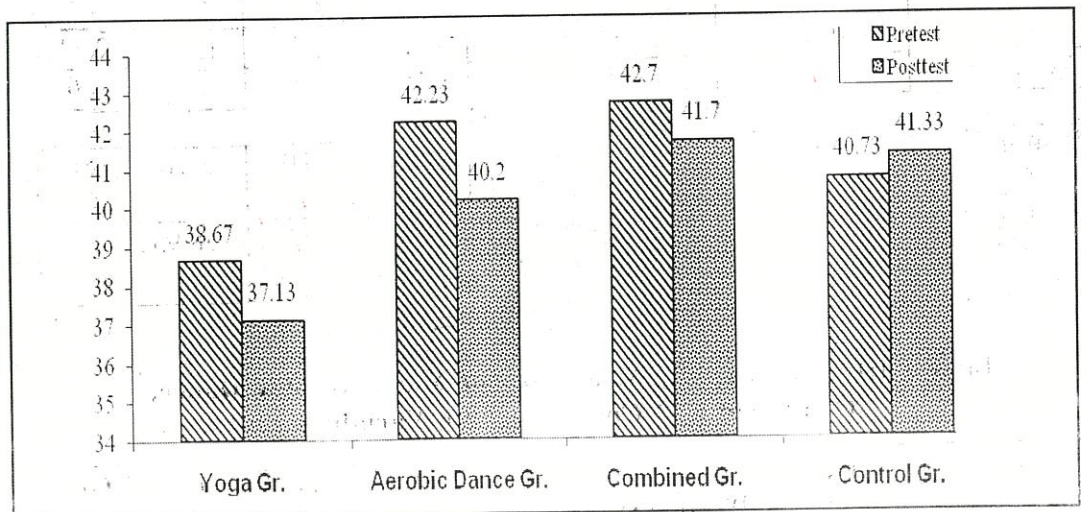


Fig. 1 : Pre-test and Post-test of weight of four groups

Regarding training programme body weight a great variation may be observed among the various researchers. House et al (1988), Yshizawa et al (1990) found increase of body weight following training and McIntosh (1983), Whatley et al (1994), Pollock et al (1975), Shome (Basu) (1998)

also found decrease in body weight following training.

Physiological Variables

Physiological variables measured, in this study, were resting heart rate and pre-exercise heart rate, of four groups.

Table - 2 : Analysis of Variance (ANOVA) for Resting Heart Rate among the Four Groups

	Source of Variation	SS	df	MS	F
Pre-test	Between Groups	63.37	3	21.12	2.10
	Within Groups	1165.80	116	10.05	
	Total	1229.17	119		
Post-test	Between Groups	93.63	3	31.21	2.28
	Within Groups	1585.97	116	13.67	
	Total	1679.59	119		

$F_{0.05} = 2.68, F_{0.01} = 3.96$, F is not significant at both levels

Table - 3 : Analysis of Covariance (ANCOVA) for R. H. R. among the Groups

Source of Variation	Df	$SS_{X.Y}$	$SS_{Y.X}$	$MS_{Y.X}(V_{Y.X})$	$F_{Y.X}$	SD_{YX}
Among Gr. Means	3	3.98	143.00	47.67	11.29	2.05
Within Gr. SS	115	1132.60	485.62	4.22		
Total	118	1136.58	628.62			

$F_{0.05} = 2.68, F_{0.01} = 3.96$, F is significant at 0.01 level

Table - 4 : Significance of differences among adjusted Y means of R. H. R.

Variables	SED	df	Diff. Adjusted Means	Sig. at 0.05 or 0.01 level
Yoga Gr. vs. Aerobic Dance Gr.	0.53	115	0.34	NS
Yoga Gr. vs. Combined Gr.	0.53	115	0.67	NS
Yoga Gr. vs. Control Gr.	0.53	115	2.51**	0.01
Aerobic Dance Gr. vs. Combined Gr.	0.53	115	1.01	NS
Aerobic Dance Gr. vs. Control Gr.	0.53	115	2.85**	0.01
Combined Gr. vs. Control Gr.	0.53	115	1.84**	0.01

*Sig. at 0.05 level, **Sig. at 0.01 level, NS is not significant.

From Table-1(a) & 1(b) it was found that mean scores and SD of RHR before training of all the groups were 64.07 ± 3.58 , 62.57 ± 3.15 , 62.93 ± 3.10 and 62.10 ± 2.81 and after training were 61.97 ± 4.54 , 60.17 ± 3.00 , 61.53 ± 4.15 and 62.57 ± 2.81 , respectively.

Participating in yoga and aerobic programme, all the experimental group decreased their R. H. R. Since all the mean scores of RHR were not equal, analysis of

variance was computed in Table 2 to find the significant difference among the four means. It was observed from the Table 3 that F value was significant at 0.01 level. ANCOVA was done to find out the significant effect after participating the exercise programme among the groups. Following training resting heart rate decreases is now an established conclusion.

**Table - 5 : Analysis of Variance (ANOVA) for
Pre-Exercise Heart Rate among the Four Groups**

	Source of variation	SS	df	MS	F
Pre-test	Between Groups	485.49	3	161.83	
	Within Groups	3996.10	116	34.45	4.70
	Total	4481.59	119		
Post-test	Between Groups	511.57	3	170.52	
	Within Groups	3386.40	116	29.19	5.84
	Total	3897.97	119		

F0.05 = 2.68, F0.01 = 3.96,

F is significant at both levels.

**Table - 6 : Analysis of Covariance (ANCOVA) for
Pre-Exercise Heart Rate among the Groups**

Source of Variation	Df	SS _{X.Y}	SS _{Y.X}	MS _{Y.X} (V _{Y.X})	F _{Y.X}	SD _{YX}
Among Gr.Means	3	333.92	289.48	96.49	15.88	2.46
Within Gr. SS	115	3277.30	698.61	6.07		
Total	118	3611.22	988.09			

F0.05 = 2.68,

F0.01 = 3.96,

F is significant at both levels.

Table - 7 : Significance of differences among adjusted Y means of Pre-Exercise Heart Rate

Variables	SED	df	Diff. Adjusted Means	Sig. at 0.05 or 0.01 level
Yoga Gr. vs. Aerobic Dance Gr.	0.64	115	1.27*	0.05
Yoga Gr. vs. Combined Gr.	0.64	115	0.92	NS
Yoga Gr. vs. Control Gr.	0.64	115	2.70**	0.01
Aerobic Dance Gr. vs. Combined Gr.	0.64	115	0.34	NS
Aerobic Dance Gr. vs. Control Gr.	0.64	115	3.97**	0.01
Combined Gr. vs. Control Gr.	0.64	115	3.62**	0.01

*Sig. at 0.05 level, **Sig. at 0.01 level, NS is not significant.

From Table 1(a) & 1(b), it was found that mean scores and SD of pre exercise heart rate, before training of all the groups, were 81.17 ± 8.23 , 81.90 ± 4.99 , 76.77 ± 4.17 and 78.93 ± 5.27 and after training were 77.90 ± 7.06 , 77.23 ± 4.78 , 73.37 ± 4.08 and 78.77 ± 5.24 , respectively.

Participating in yoga and aerobic programme, all the experimental group decreased their pre exercise heart rate. Since all the mean scores of pre exercise heart Rate were not equal, analysis of variance was computed (Table 5) to find the significant difference among the four means. It was observed (Table 6) that F value was significant at both levels. ANCOVA was done to find out the significant effect among the groups. After participating the exercise programme the difference of pre-exercise heart rate among the groups (Table 7). So, treatment had positive effect. It was shown that after following exercises pre exercise heart rate

of all the groups decreased, except that of the control group.

A number of researchers had shown it in their research report. Bramwell and Ellis (1929); Shoenfeld and Karen (1981); Banerjee (1987), Alteri (1975); Bandyapadhyay (1992); Mandal & Banerjee (1994); Shome (Basu) (1998) have shown significant reduction in heart rate following training.

CONCLUSION

On the basis of the results and discussion, following the conclusions were drawn

1. Means scores of weight of all the experimental groups of adolescent girls decreased. The weight of aerobic dance group decreased relatively more than the other three groups.
2. Resting heart rate was significantly decreased of all the groups that of the except control group.
3. Pre-exercise heart rate significantly decreased in all the groups, except that

of the control group. participated for about six weeks, definitely improved their performance in selected physiological potentialities.

The organised yoga and aerobic dance programme, in which the girls subjects

REFERENCES

- Barrow & McGee (1979).** A Practical Approach to Measurement in Physical Education, Philadelphia : Lea & Febiger.
- Brian Dana Akers (2002).** The Hatha Yoga Pradipika. The original Sanskrit Svatmarama, an English Translation. New Age Book.
- Burley, Mikel Frawley, David (2000).** Hatha Yoga in context. Theory & Practice. Motilal Banarsidass Publishers Private Limited.
- Chatterjee, C. C. (1986).** Human Physiology, Calcutta Medical Allied Agency.
- Clark, H. Harrison (1976).** Application of Measurement of Health & Physical Education, 5th edition Englewood Cliffs. New Jersey : Prentice Hall Inc.
- Fox, Edward L. & Mathews, Donald K. (1971).** Physiological Basic of Physical Education and Athletics. New York : Saunders College Publishing, p. 647.
- Gharote, M. L. & Datey, K. K. (1983).** Yoga and Your Heart. Jaico Publishing House, Bombay, Delhi, Bangalore, Hyderabad, Calcutta.
- Johnson, L. Barry & Nelson, K. Jack (1988).** Practical Measurements for Evaluation in Physical Education, Surjeet Publication.
- Mathews, Donald K. (1978).** Measurement in Physical Education, Philadelphia : W. B. Saunders Co. 5th Ed.
- Ronald, Hutchinson,** Yoga a way of life. The Hamlyn Publishing Group Limited, London.
- Shaver, Larry G. (1982).** Essential of Exercise Physiology, Delhi : Surjeet Publication.
- Yesudian, Selvaranjan & Haich, Elizabeth (1976).** Yoga and Health, Unwind Books. London.

★ ★ ★