Effect of Hatha Yoga and Aerobic Dance Practice on Resting Heart Rate and Pre-Exercise Heart Rate of Adolescent Boys.

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Abstract— At present situations yoga is an important part of all the members in this world. To develop the technology, yoga is also developed. 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 program definitely improved their performance in selected Resting Heart Rate and Pre-exercise Heart Rate.

Indexed Terms— Yoga, Aerobic dance, Resting Heart Rate, Pre-exercise Heart Rate.

I. INTRODUCTION

Yoga has a great antiquity, long tradition and is a result of thousand of years of careful and systematic exploration by the long time of 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, religion all in unison. Any reference to yoga must symbolize the integrated whole and not any part of it. It is a science of life which helps man to attain their highest potential and highest state of consciousness through the asanas, Pranayamas etc.

The origin of hatha yoga developed in India. In Sanskrit, 'Ha' means 'Sun' and 'Tha' means Moon. 'Hatha' means 'forceful' implying that powerful work must be done to purify the body. 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 describes any type of exercise, typically performed at moderate levels of intensity for extended period of time that increases the heart rate.

In this article an attempt has been made to observe the improvement occur in selected Resting Heart Rate and Pre-exercise Heart Rate following aerobic and yoga practices among the adolescent boys.

II. 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 boys.
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.

III. 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 treatments was 6 weeks and each group practiced three days in a week and duration was 30 minutes which supervised exercise program for experimental subjects and control group continued usual activity. The subjects practiced the Asanas and Pranayamas.

Yoga Group : Practiced Tadasana, Tratoka, Chakrasana, Surya Namaskar, Sarbangasana

Halasana, Paschimothanasana and Pranayams were Nadi Sodhana, Kapalbhati, Bhamari, Yoga-Nidra.
Aerobic Dance Group : Practiced aerobic dance with music.

Combined Group : Practiced Yoga 15 min. / day and aerobic 15 min. / day approximately.
Control Group : The control group subjects were 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.

IV. RESULTS AND DISCUSSION

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

Variables

	Yoga Gr. (Mean ± SD)	Aerobic Dance Gr. (Mean ± SD)	Combined Gr. (Mean ± SD)	Control Gr. (Mean ± SD)
Personal Data				
Age	13.77 ± 1.25	13.8 ± 0.81	14.67 ± 0.99	14.90 ± 0.92
Height	141.70 ± 6.10	149.37 ± 4.43	151.37 ± 9.08	150.30 ± 8.54
Weight	38.67 ± 5.96	42.23 ± 4.72	42.70 ± 7.00	40.77 ± 5.16
Physiological Variables				
Resting Heart Rate	64.07 ± 3.58	62.57 ± 3.15	62.93 ± 3.10	62.10 ± 2.81
Pre Exercise Heart Rate	81.17 ± 8.23	81.90 ± 4.99	76.77 ± 4.17	78.93 ± 5.27

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

Variables

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

- Personal Criteria :

The age, height and weight of the subjects had been 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 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 ± 8.54 cm. respectively 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 in Table–1(a) and Fig. No. 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 in Table No. – 1(b) and Fig. 1. After completion of the training programme mean scores of weight of all experimental groups were decreased slightly.

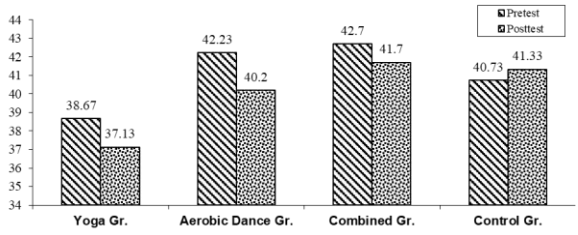

Fig. 1 : Pretest and Posttest of weight of four groups

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, Mclntosh (1983), Whatley et al. (1994), Pollock et al (1975), Shome (Basu) (1998) found decrease in body weight following training.

Physiological Variables :

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

Resting Heart Rate :

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	S_{ED}	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.

Pre-Exercise Heart Rate :

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	4.70
	Within Groups	3996.10	116	34.45	
	Total	4481.59	119		
Post-test	Between Groups	511.57	3	170.52	5.84
	Within Groups	3386.40	116	29.19	
	Total	3897.97	119		

$F_{0.05}$ = 2.68, $F_{0.01}$ = 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			

$F_{0.05}$ = 2.68, $F_{0.01}$ = 3.96, F is significant at both levels.

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

Variables	S_{ED}	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 in Table–5 to find the significant difference among the four means. It was observed from the 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 control group.

A number of researchers had shown their research report. Bramwell & 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 discussions, the conclusions may be drawn

1. Means scores of weight of all the experimental groups of adolescent boys were decreased in their body weight. Aerobic dance group was decreased in relatively more than other three groups.
2. Resting Heart Rate was significantly decreased of all the groups except control group.
3. Pre-Exercise Heart Rate significantly decreased in all the groups, except control group.

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