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Effects of Different Modes of Yoga Practice on Resting Pulse Rate High Density Lipoprotein and Total Cholesterol

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Abstract

The purpose of the present study was to find out the effect of different modes of yoga practice on resting pulse rate, high density lipoproteins and total cholesterol among middle aged men. For this purpose, forty five middle aged men residing around Kumbakonam town, Thanjavur district, Tamilnadu, were selected as subjects. The age of the subjects were ranged from 40 to 45 years. They were divided into three equal groups, each group consisted of fifteen subjects, in which experimental group - I underwent Bihar School of yoga practice, experimental group - II underwent B.K.S. Iyengar yoga practice and group - III acted as control that did not participate in any special activities apart from their regular curricular activities. The training period for the study was six days (Monday to Saturday) in a week for twelve weeks. Prior and after the experimental period, the subjects were tested on resting pulse rate, high density lipoprotein and total cholesterol. Resting pulse rate was assessed by counting the arterial pulse rate at resting condition of the subject. High density lipoprotein and total cholesterol were tested after taking 5 ml of blood samples by venous puncture method, by using Boehringer Mannheim Kit Method. The Analysis of Covariance (ANCOVA) was applied to find out any significant difference between the experimental groups and control group on selected criterion variables. The result of the study shows that the Bihar School of Yoga practice group and B.K.S. Iyengar Yoga practice group were decreased the total cholesterol and increased the high density lipoprotein and resting pulse rate significantly. It was concluded from the results of the study that Bihar School of Yoga practice and B.K.S. Iyengar Yoga practice has bring positive changes in resting pulse rate, high density lipoprotein and total cholesterol as compare to the control group. Moreover it was also concluded that there was no significant difference was found between the experimental groups in all criterion variables.

Keywords: Bihar School of Yoga and B.K.S. Iyengar Yoga, Resting pulse rate, high density lipoprotein, total cholesterol, Boehringer Mannheim kit method, ANCOVA.

Introduction

Yoga is one of the most ancient cultural heritages of India. The word yoga in Sanskrit means "to unite", and so *yoga* can be said to connote a unitive discipline. In this sense, it is an exercise in moral and mental cultivation that generates good health (*arogya*), contributes to longevity (*chirayu*), and the total intrinsic discipline culminates into positive and perennial happiness and peace.[1] Yoga is one of the orthodox systems of Indian philosophy. It was collated, coordinated and systematized by Patanjali in his classical work, the Yoga Sutras, which consists of 185 terse aphorisms. Yoga is a complete science of life that originated in India many thousands of years ago. It is the oldest system of personal development in the world, encompassing body, mind and spirit. [2] Bihar School of

Yoga (Swami Satyananda Saraswati) is a type of yoga which integrates intellect, emotion and action: the head, heart and hands. Known as Satyananda Yoga or Bihar Yoga (the School lies in Bihar in India), the system embraces many different philosophies and encourages students to examine the very essence of their being and make gradual changes to improve their awareness. Satyananda Yoga is considered truly holistic and suitable for everyone.[3] Iyengar Yoga, named after and developed by B.K.S. Iyengar, is a form of Hatha Yoga that has an emphasis on detail, precision and alignment in the performance of posture (asana) and breath control (pranayama).[4]

Recent scientific studies of the effects of yoga and meditation on health validates its ability to improve virtually every aspect of our functioning—brain function, hormonal function, sleep, mood, balance, etc. More active practices followed by relaxing ones lead to deeper relaxation than relaxing practices alone, documented by research from Swami Vivekananda yoga research foundation near Bangalore city and possibility

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of neuroplasticity bringing about changes in the hypo-pituitary–pancreatic axis.[5] The improvement in the lipid levels after yoga could be due to increased hepatic lipase and lipoprotein lipase at cellular level, which affects the metabolism of lipoprotein and thus increase uptake of triglycerides by adipose tissues.[6,7] Direct stimulation of the pancreas by the postures can rejuvenate its capacity to produce insulin.[8] Regeneration of pancreatic beta cells could occur by yoga exercises that promote blood circulation in the region of the pancreas and yoga asanas that stimulate the meridian of pancreas also could assist in some diabetic patients.[9] Pranayama practices, stretches the lung tissue producing inhibitory signals from action of slowly adapting receptors and hyperpolarizing currents. These inhibitory signals coming from cardio-respiratory region involving vagi are believed to synchronize neural elements in the brain leading to changes in the autonomic nervous system; and a resultant condition characterized by reduced metabolism and parasympathetic dominance.[10]

Methodology

Thirty middle aged men residing around Kumbakonam town, Tanjavur district, Tamilnadu were selected as subjects. The age of the subjects were ranged from 18 to 23 years. The selected subjects were divided into three equal groups, each group consisted of ten subjects, in which group - I (n = 15) underwent Bihar School of Yoga practice, experimental group - II (n = 15) underwent B.K.S. Iyengar Yoga practice and group – III (n = 15) acted as control, which did not participate in any special activities apart from their regular curricular activities. Different modes of yoga practices were conducted six days (Monday to Saturday) per week for twelve weeks. The researcher consulted with the yoga experts and selected the following variables as criterion variables: 1. resting pulse rate, 2. high density lipoprotein and 3.total cholesterol. The resting pulse rate was assessed by counting the arterial pulse rate at resting condition of the subject and it was recorded in numbers per minute, high density lipoprotein and total cholesterol were assessed by using the Boehringer Mannheim Kit method. For the purpose of collection of data the subjects were asked to report at early morning, one day prior and one day after experimental period, in fasting condition. 5 ml of blood was collected from each subject by venous puncture method and the blood thus collected was stored in small bottles for pre and post-test for measuring the high density lipoprotein and cholesterol. Analysis of covariance (ANCOVA) was applied to find out the significant difference if any, among the experimental groups and control group on selected criterion variables separately. In all the cases, .05 level of confidence was fixed to test the significance, which was considered as appropriate. After applying the analysis of covariance, the result of this study shows that there was a significant increase in resting pulse rate, decrease in total cholesterol and high density lipoprotein levels.

Results

The data collected on resting pulse rate, high density lipoprotein and cholesterol among experimental and control groups were analyses and the results were presented in Table – I.

Table I. Analysis of Covariance on Selected Criterion Variables among Exercise Groups and Control Group

Variable Name	Group Name	Bihar School of Yoga Practice Group	B.K.S. Iyengar Yoga Practice Group	Control Group	'F' Ratio
Resting Pulse Rate (Nos. / minute)	**Pre-test Mean ± S.D**	76.80 ± 1.014	76.67 ± 1.589	76.73 ± 0.961	0.45
	Post-test Mean ± S.D.	75.47 ± 1.125	75.27 ± 1.486	77.60 ± 1.502	13.128*
	Adj. Post-test Mean	75.410	75.323	77.600	29.068*
High Density Lipoprotein (mg/dl)	**Pre-test Mean ± S.D**	45.07 ± 2.463	44.53 ± 3.021	44.87 ± 2.95	0.137
	Post-test Mean ± S.D.	47.60 ± 2.772	46.80 ± 3.189	44.00 ± 2.80	6.253*
	Adj. Post-test Mean	47.357	47.088	43.956	77.42*

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Total Cholesterol (mg/dl)	Pre-test Mean ± S.D	191.53 ± 6.39	192.27 ± 6.029	192.47 ± 5.04	0.106
	Post-test Mean ± S.D.	188.80 ± 6.33	190.13 ± 6.034	192.53 ± 6.36	1.532
	Adj. Post-test Mean	189.350	189.957	192.160	20.472*

*Significant .05 level of confidence. (The table values required for significance at .05 level of confidence with df 2 and 42 and 2 and 41 were 3.22 and 3.21 respectively).

Table – I shows that pre and post test means 'f ratio of Bihar School of Yoga practice group, B.KS Iyengar practice group and control group on resting pulse rate were 0.45, which is insignificant and 13.128, which is significant at 0.05 level of confidence. The adjusted post test mean 'f' ratio value of experimental groups and control group was 29.068, which was significant at 0.05 level of confidence. The pre and post test means 'f ratio of Bihar School of Yoga practice group, B.KS Iyengar practice group and control group on high density lipoproteins were 0.137, which is insignificant and 6.253, which is significant at 0.05 level of confidence. The adjusted post test mean 'f' ratio value of experimental groups and control group was 77.42, which was significant at 0.05 level of confidence. The pre and post test means 'f ratio of yogasana practice group, aerobic exercise group and control group on total cholesterol were 0.106 and 1.532 which is insignificant at 0.05 level of confidence. The adjusted post test mean 'f' ratio value of experimental groups and control group was 20472, which was significant at 0.05 level of confidence.

Table II. Scheffẽ S Test for the Difference Between the Adjusted Post-Test Mean of Selected Criterion Variables

Adjusted Post-test Mean on Resting Pulse Rate				
Yogasana Practice Group	Aerobic Exercise Group	Control Group	Mean Difference	Confidence interval at .05 level
75.410	75.323		0.087	0.8574987
75.410		77.600	2.19*	0.8574987
	75.323	77.600	2.277*	0.8574987
Adjusted Post-test Mean on High Density Lipoproteins				
Yogasana Practice Group	Aerobic Exercise Group	Control Group	Mean Difference	Confidence interval at .05 level
47.357	47.088		0.269	0.7395837
47.357		43.956	3.401*	0.7395837
	47.088	43.956	3.132*	0.7395837
Adjusted Post-test Mean on Total Cholesterol				
Yogasana Practice Group	Aerobic Exercise Group	Control Group	Mean Difference	Confidence interval at .05 level
189.350	189.957		0.607	1.16883531
189.350		192.160	2.81*	1.16883531
	189.957	192.160	2.203*	1.16883531

* Significant at .05 level of confidence.

Table – II shows that the Scheffẽ *S* Test for the   difference between adjusted post-test mean on resting

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pulse rate of Bihar School of Yoga practice group and control group (2.19) and BKS Inyengar Yoga Practice group and control group (2.277), which were significant at .05 level of confidence. There was a significant difference on high density lipoproteins between Bihar School of Yoga practice group and control group (3.401) and BKS Inyengar Yoga Practice group and control group (3.132) and also there was a significant difference on total cholesterol between Bihar School of Yoga practice group and control group (2.81) and BKS Inyengar Yoga Practice group and control group (2.203) which was significant at 0.05 level of confidence after the respective training programme.

Conclusions

The experimental groups such as, Bihar School of Yoga practice group and B.K.S. Iyengar Yoga practice group have achieved a significant improvement in selected criterion variables such as resting pulse rate, high density lipoprotein and a significant reduction in total cholesterol when compared with the control group. It was also found that there was no significant difference was found between the Bihar School of Yoga practice group and B.K.S. Iyengar Yoga practice group on selected criterion variables.

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