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Effect of Aerobic and Yogic Training on Blood Sugar Level of Type-2 Diabetes Mellitus of Elderly Rural Population of Bengal

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Abstract

Background: The veracity of modern medical science is based on controlled clinical trials. Blood sugar is a product of the interaction of a biological organism with the social environment. It is the way an individual adjusts with his external environment, and responding to the environment. Aim: The purpose of the study was to investigate the effect of Aerobic, Yogic practice and combination of aerobic and yogic practices on blood sugar of noninsulin dependent diabetes mellitus of rural elderly male population. Method: Subjects were divided into four equal groups on random basis (Groups A, B, C & D) consisting of 10 subjects in each group. Three out of the four groups were given experimental treatments i.e. Aerobic training (Group- A), Yogic training (Group- B) and combination of Aerobic and Yogic training (Group-C) and While the remaining one group (Group- D) was designated as control group. Results: significant differences were noticed in blood sugar. Conclusion: The yogic training is found to be more effective in changing the blood sugar in comparison to the effect of aerobic training and combination of aerobic and yoga training on aforesaid biochemical components.

Keywords: Hatha Yoga, Aerobic training, Blood sugar, Non-Insulin Dependent Diabetes Melitus (NIDDM), Rural elderly male population.

1. Introduction

No society can either deny or under-estimate the impact of urbanization on rural life. It is due to this impact that many changes in the social life of the villagers are being witnessed. The villagers are now also becoming fashion minded under the influence of cities and the use of cosmetics in the villages is on the increase. In the villages new occupations are now being introduced and thus today under the influence of city the people in the villages prefer other professions over their ancestral profession of agriculture. Today a villagers like to prefer a motor cycle, cycle or bus over walking on foot which he would have preferred about few decades back.

According to WHO estimation in 2005, 400 million adults (9.8%) are obese, with higher rates of obesity among women than men. Increased weight gain, which is associated with increased lean and fat mass, along with the associated increase in total blood volume may be accompanied by an increase in stroke volume, cardiac output and circulatory preload and after load that can lead to left ventricular hypertrophy and sustained rise in blood pressure.

Regular exercise can markedly reduce body weight and fat mass without dietary caloric restriction in overweight individuals. A minimum of 60 min, but most likely 80–90 min of moderate-intensity physical activity per day maybe needed to avoid or limit weight regain and to prevent and treat cardiovascular diseases in formerly overweight or obese individuals.

Indians had adopted Yoga as a life-style since the beginning of civilization. Mind is the king of the senses. One who has conquered his mind, senses, passions, through and reason, is a king among men. That man is fit for hatha yoga, the royal union with the universal spirit. One who has conquered his mind has complete mastery of his self. The scientific nature of the Yogic practice was first revealed in 1924, when Swami Kuvalyanandaji started his scientific research in the field of Yoga. The origins of hatha yoga have been traced back to the eleventh century A.D. The Sanskrit word ha means "sun" and the means "moon" and thus hatha, or literally sun-moon yoga, strives to balance opposing parts of the physical body, the front and back, left

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and right, top and bottom. In addition to breathing, hatha yoga utilizes asanaas, or physical postures, to bring about flexibility, balance and strength in the body. Yogis claim that although hatha yoga can make the body as strong and fit as any exercise program, its real benefits come out because it is a system of maintenance and balance for the whole body.

Each of the systems in our body (cardiovascular, neuromuscular, respiratory and other) is influenced by exercise. Each system is affected in a manner specific to the kind of exercise performed. Aerobic exercise emphasizes improvement of the metabolic, cardiovascular, respiratory, and muscular systems.

Aerobic fitness is a complex component of physical fitness. It involves the interaction of numerous physiological processes in the cardiovascular, respiratory, and muscular system. Thus, the combined cardiovascular and respiratory system is the oxygen supply mechanism for the muscles. If we are committed aerobic exercise in combination with a sensible diet it can help to provide an overall sense of well-being and it can even help to prevent chronic illness, disability and premature death. There are also many benefits of aerobic training like performance enhancement. Body composition changes, body heat transfer system improvement, personality development, avoid stress and anxiety etc. Thereby a humble attempt was taken in this study to investigate the comparative effect of aerobic and yogic practice on specific biochemical component of blood sugar of noninsulin dependent diabetes mellitus of rural male population of district Bankura only.

Materials and Method

Selection of variables

Sixty rural non-insulin dependent diabetic mellitus of male population of Village- Bigna and Mankanali, Subdivision Bankura, Dist- Bankura, West Bengal, were randomly selected as the subjects for this study with an age range of 45 to 60 years.

The subjects were participated voluntarily in the programme after examined by the physician to ascertain that they were free from any type of medical problems and were fit enough to go through Aerobic training, Hatha yoga training and combination of Aerobic and Hatha yoga training programmes for ten weeks. Subjects were divided into four equal groups on random basis (Groups A, B, C & D) consisting of 10 subjects in each group. Three out of the four groups were given experimental treatments i.e. Aerobic training (Group- A), Yogic training (Group- B) and combination of aerobic and yogic training (Group-C) and while the remaining one group (Group- D) was designated as control group, which were not given any experimental treatment. The resting blood sugar

scores were obtained by using semi-auto-analyzer from the subjects of all the groups.

Administration of Tests

Method of testing blood sugar (Impaired fasting glycemia) test:

1. Wash and dry your hands—using warm water may help the blood flow.
2. Turn on the meter and prepare a test strip.
3. Choose spot—don't check from the same finger all the time
4. Get a drop of blood from the side of your fingertip or other approved site.
5. Check your blood sugar by touching and holding the test strip opening to the drop until it has absorbed enough blood to begin the test.
6. View your test result and take the proper steps if your blood sugar is too high or low, based on your healthcare professionals' recommendations.

Scoring: milligrams per deciliter. (mg/dL)

Administration of training programme

A ten weeks aerobic training, hatha yoga training and combination Hatha yoga and aerobic training programme for three days in a week i.e., on Monday, Wednesday & Friday were conducted. The training programme was administered in the morning session of the day. The control group was continued their regular programme as usual.

Statistical Procedure

In order to investigate the comparative effect of each training method i.e Aerobic training, Hatha yoga training, and combination of Hatha yoga and aerobic training, on Blood sugar among three experimental groups and one control group of the non-insulin dependent diabetic mellitus of rural elderly undertaken on this study, the analysis of co-variance statistics was applied.

In case of existence of significant, the post-hoc test was applied in order to investigate the existence significant differences if any, among three experimental groups namely aerobic training, yogic training and combination of yogic and aerobic training and one control group of noninsulin dependent diabetes mellitus of rural male population. The significant level was set at 0.05 level of confidence.

Results

The results were given in the following tables & figures.

Table 1: Computation of Analysis of Co-Variance of Arabic Group, Yogic Group, Combined Group and Control Group on Stress

Test	Arabic Group	Yogic Group	Combined Group	Control Group	SV	SS	DF	MS	F
Pre Test	242.58	242.996	242.37	242.04	Between	-587427.36	3	-195809.12	0.04
					Within	853860.50	36	23718.34	
Post Test	239.3	237.5	240.20	245.2	Between	-576634.3	3	-192211.43	8.29
					Within	834584.2	36	23182.89	
Adjusted Post Test	179.33	177.12	180.44	185.76	Between	389.776	3	129.92	8.79*
					Within	517.086	35	14.77	

*Significant at 0.05 level F.05 (3, 36) =2.86F.05 (3, 35) =3.93

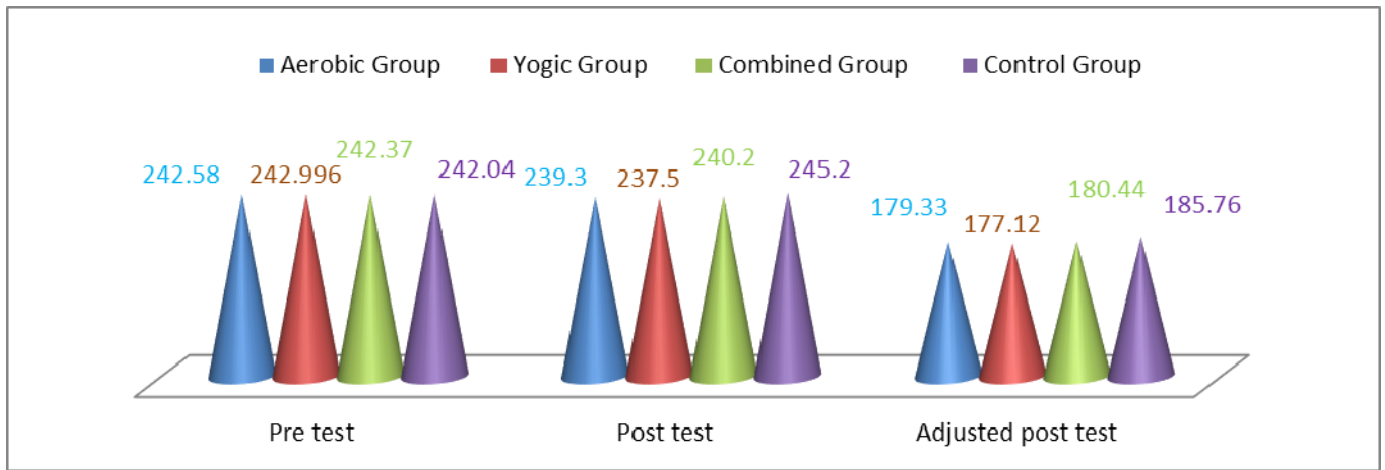


Figure-1

Table 1 and Figure 1, revealed no significant differences in fasting blood sugar in pre test phase among three experimental training groups (aerobic training, yogic training, combination of yogic and aerobic training groups) and one control group. The obtained 'F' value 0.04 was found to be lesser than that of required 'F' value 2.86 at 0.05 level of confidence with 3, 36 degree of freedom to be significant. However, the 'F' ratio values in post test phase (8.29), and adjusted post-test phase (8.79) were found to be significant for being greater than the required ('F' values 2.86 and 3.93 to be

significant at 0.05 level of confidence) with 3, 36 and 3, 35 degree of freedom respectively. As in analysis of co-variance the significant difference in fasting blood sugar in adjusted post-test means among aerobic training, yogic training, combination of yogic and aerobic training groups and one control group were found, further in order to find out the existence of significant difference between paired adjusted final means, the post-hoc test were computed, which is presented in table 2.

Table 2: Paired Adjusted Final Means and Difference Between Means Of Four Different Groups Related To Stress

Arabic Group	Yogic Group	Combined Group	Control Group	MD	Critical difference
179.33	177.12	-	-	2.21	4.05
179.33	-	180.44	-	1.11	4.05
179.33	-	-	185.77	6.43*	4.05
-	177.12	180.44	-	3.32	4.05
-	177.12	-	185.77	8.64**	4.05
-	-	180.44	185.77	5.33*	4.05

*Significant at 0.05 level of confidence.

The Table 2, (post-hoc test) in respect to the paired adjusted final means differences in fasting blood sugar clearly indicates significant difference between aerobic training and control group (6.43), between yogic training and control group (8.64) and between combination of aerobic and yogic training group and control group (5.33) in noninsulin dependent diabetes mellitus of rural male population, which were found to be greater than that of critical value 4.05. However, no significant difference between other paired group mean namely between aerobic training yogic (2.21), aerobic training and combination of aerobic and yogic training group (1.11) and between yogic practice group and combination of aerobic and yogic training group (3.32) was noticed, in which the observed mean difference values was found to be lesser than that of critical value (4.05).

Discussion of findings

Table 1 and Figure 1, revealed insignificant difference in fasting blood sugar frequency in pre test phase (F = 0.04 < 2.86 at 0.05 level of confidence) with 3, 36 degree of freedom among three experimental groups and one control group. In the pre test phase it was also noticed that the mean values of aerobic training (M=242.58), yogic training (M=242.996), and combination of aerobic and yogic training group (M=242.37), and control group (M=242.04) were almost the same and thus initially no significant difference in (NIDDM) among three

experimental training groups namely (aerobic training group, yogic training group, and combination of aerobic and yogic training group) and one control group in pre test phase was observed, which highlights that the random assignment of the group were quite successful. On the other hand the significant difference in (NIDDM) in post and adjusted post test means were observed (F=8.26 and 8.79 > 4.05 and 4.05 with 3, 36 and 3, 35 degree of freedom respectively) at 0.05 level of confidence. Research has suggested that yoga's contribution to stress reduction actually may moderate the impact of diabetes. High levels of stress hormones have been shown to raise blood glucose levels, promote overeating, lead to the accumulation of intra-abdominal fat, contribute to insulin resistance, and boost heart attack risk. By reducing stress hormone levels, yoga can minimize these side effects.1 While the exact physiological mechanisms contributing to yoga's benefits for diabetes aren't fully understood, Eastern medicine philosophy states that certain yoga poses stimulate and massage internal organs, including the pancreas, which produces insulin. Yoga also has been shown to normalize endocrine gland function and digestion.1 From such result it may also be assumed that hatha yoga training was having greater significant effect on blood sugar in comparison to the aerobic training and combination of hatha yoga and aerobic training groups.

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