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## Effect of yoga and aerobic dance on biochemical variables in sedentary individuals

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### Abstract

Sedentary lifestyle has associated with poor health outcomes. Any waking behavior with low energy expenditure is sedentary lifestyle. Because of sedentary life style there are various physiological changes occurs in the human body. Multiple changes in the biochemical variables are seen in sedentary behavior. Yoga is one of our traditional methods which promotes active life style and also aids in health life style. Aerobic dance is a form of aerobic exercises which improves the individual's health through dance movements. Since there are not much studies comparing the aerobic dance and yoga this study aims to identify the effect of aerobic dance and yoga therapy on various biochemical variables in sedentary individuals. 50 subjects were selected using random sampling method based on International physical activity questionnaire (IPAQ) and they all randomly divided into two groups. Both underwent a protocol of exercises for 12 weeks. Biochemical variables includes HDL, LDL, Total Cholesterol, Triglycerides and Hemoglobin levels were calculated and taken for analysis using SPSS 21.0. The result of the study between yoga and aerobics shows that total cholesterol is 2.69 with  $p < 0.05$ , HDL is 2.45 with  $p < 0.05$ , LDL is 4.66 with  $p < 0.05$ , Triglycerides is 2.57 with  $p < 0.05$ , and Hemoglobin is 2.45 with  $p < 0.05$ . The study concludes that yoga has shows improvement in the LDL, HDL and total cholesterol whereas, aerobic dance shows improvement in the Triglycerides and hemoglobin values in sedentary individuals.

**Keywords:** Sedentary individual, yoga exercises, aerobic dance, high density lipoprotein (HDL) cholesterol

### 1. Introduction

A technological advance makes the man to do less physical activities which result in sedentary behavior. There is an increase in the sitting behavior in human and it has become much common in this era <sup>[1]</sup>. Sedentary lifestyle as a class of behavior and it is characterized by little or no physical movements and with less energy expenditure of less than 1.5 METs. <sup>[2]</sup>. Sedentary lifestyle often associated with the increased risk of morbidity. It worsens the diseases and may cause cardiovascular diseases, stroke, and certain forms of cancer, osteoporosis, diabetes mellitus, hypertension and obesity <sup>[3]</sup>.

In addition to the life style changes poor food habits with lack of physical activity could result in weight gain, and other metabolic disorders. Increased time spent on sedentary activities and reduction on physical activity has been reported to associate the risk of developing metabolic syndrome <sup>[4]</sup>. Exercise plays a major role in maintaining fitness and improves the functions. Exercises like aerobics will produce beneficial effects for any group providing the exercise is specific and appropriate to the level of fitness of an individual. Aerobic dance is a form of physical exercises which combines rhythmic aerobic exercises including stretching, strengthening with a goal to improve fitness. Aerobics can help the body and mind to relax <sup>[5]</sup>. Movements are performed with the music and may be practiced in a group setting led by instructors. Aerobic dance was developed to improve flexibility and mobility in the body <sup>[6]</sup>. Aerobic dance is to strengthen the body, lose weight, build muscles and it is suitable for the whole body exercises. It can be performed by any individuals irrespective of their gender.

Yoga is an ancient Indian art and it is an integrated technique for mind, body management <sup>[7]</sup>. Yoga is a form of physical activity consists of postures, which often connected by flowing sequences and accompanied with rhythmic breathing and relaxation <sup>[8]</sup>. Yoga produces many physical and mental changes through its beneficial effects on endocrine, metabolic and neurohumoral processes. It also helps to improve the function of the body with homeostasis

through improved functioning of the psychoimmuno-neuro-endocrine systems. It aids to produce a balanced equilibrium between the sympathetic and parasympathetic wings of the autonomic nervous system leads to a dynamic state of health<sup>[9]</sup>. Since there was no much studies on comparing between the aerobic exercises and yoga on various biochemical parameters this study identifies to compare the effect of aerobic and yoga on various biochemical parameters in sedentary individuals.

## 2. Methodology

This study was submitted to the Institutional ethical committee, and it was approved by the team of members. This study was a single blinded randomized controlled trial. Study was conducted at the outpatient department of KG College of physiotherapy. Small notice was created about the study and was circulated in various “whatsapp” groups around the college campus notice were displayed in various areas. Volunteers were asked to register in the OPD, ledger was created to note down the volunteers. All the volunteers were evaluated for the sedentary life using International physical activity questionnaire short form. Those who are eligible were selected for the study. Overall there were 145 volunteers registered and after the IPAQ 85 volunteers were selected. Trained physiotherapist evaluates all the 85 volunteers to identify the suitability for the study based on the selection criteria. 59 volunteers were selected for the study and they were randomly allocated into two groups. Randomization was done for the eligible participants using a computer generated random sequence table by a blinded assessor. Yoga group (YG) includes 28 volunteers and Aerobic exercises group (AEG) included 31 volunteers. This study has got

predominantly male participants like 45% of males and 55% of females. Volunteers without any illness for the past 6 months, volunteers without any preexisting medical conditions, volunteers with age group of 25-45 years. Yoga group underwent a set of yogic programmes which was formulated by Malhotra *et al.*<sup>[10]</sup>, 2004. Volunteers in AEG underwent a set of aerobic exercises for Daniel *et al.*<sup>[11]</sup>, 2019. Initially the programme was conducted in the OPD, KG Campus for four week alternate days. Then the programme was advised as a home programme and the participants were monitored. There was a slow decline of participants noted in both the groups. 3 dropped out from YG and 6 dropped out from AEG. So this study concluded with 25 volunteers in each group. All the procedures were completely explained to the volunteers and written consent was obtained from all the participants before the beginning of the study. The study was conducted for 8 weeks and the measurements were taken for evaluation. Data were collected by a blinded assessor to prevent bias. Blood investigations were taken for evaluation which includes High density lipoprotein (HDL) cholesterol, Low density lipoprotein (LDL) cholesterol, Total Cholesterol, Triglycerides, Hemoglobin. All the collected data were analyzed using inferential statistics by SPSS 20.0.

## 3. Results

**Table 1:** Type of YG and AEG

	YG	AEG	p value
Age	34.36 ± 5.15	34.80 ± 5.15	p = 0.61
Gender	Males:11 Females: 14	Males: 12 Females: 13	--

**Table 2:** Type of YG (Mean/SD) and AEG (Mean/SD)

Outcome	N	YG (Mean/SD)		AEG (Mean/SD)		YG Vs AEG (Mean/SD)		p value	t value
		Before	After	Before	After	yoga	Aerobic		
Total Cholesterol	25	190.99± 9.86	175.01± 10.86	188.50± 9.80	182.85 ±9.73	175.01± 10.86	182.85 ±9.73	0.05	2.69
LDL	25	120.02± 7.29	105.82± 4.40	123.67± 5.37	112.21 ±5.25	105.82± 4.40	112.21 ±5.25	0.05	4.66
HDL	25	85.51± 9.79	99.96± 9.00	89.39± 9.99	94.10± 7.89	99.96± 9.00	94.10± 7.89	0.05	2.45
Triglyceride	25	108.76± 8.78	100.37± 8.78	109.43± 8.99	98.060± 3.823	100.36± 5.37	98.060± 3.823	0.05	2.57
HB	25	14.81± 0.84	15.30± 0.79	14.50± 1.12	15.87± 0.80	15.30± 0.79	15.87± 0.80	0.05	2.58

### 3.1 Analysis

On comparing the data's of the pre intervention, the p values yielded were statistically non-significant. This suggested that the data was homogenous in distribution. The above table II suggests that both Yoga and aerobic exercise are effective in reducing total cholesterol, HDL, LDL, Triglyceride and Hemoglobin in sedentary individuals. While comparing Hemoglobin and triglyceride between YG and AEG, the t value obtained shows significance changes in AEG compare to YG in the sedentary individuals. This suggests that Aerobic exercise have significant effects in HB and triglyceride in sedentary individuals. In contrary to that the result shows between YG and AEG in HDL, LDL and total cholesterol the t value obtained shows significance difference in YG compare to AEG in the sedentary individuals. This suggests that Yoga exercise have significant effects in HDL, LDL, and total cholesterol in sedentary individuals.

## 4. Discussion

Yoga is an ancient discipline designed to bring balance and health to the physical, mental, emotional and spiritual dimensions. It significantly decreases heart rate and blood pressure<sup>[12]</sup>. There was hypothesis that yoga could shift the

parasympathetic nervous system dominance through vagal stimulations<sup>[13]</sup> many hypothetical reasons have supported that yoga promotes raise of HDL cholesterol levels and reduce the concentration of VLDL and Triglycerides<sup>[14]</sup>. It also plays a major role in reduction of the lipid profiles and blood glucose levels and it improves quality of life<sup>[12]</sup>. There was a reduction in triglycerides and increase of HDL cholesterol is due to hydrolysis of Triglycerides rich lipoproteins which simultaneously replace intramuscular fats used during yoga and pranayama<sup>[15]</sup>.

Pal *et al.*, 2011<sup>[16]</sup> identified that yoga aids in reduction of systolic blood pressure, diastolic blood pressure, heart rate, body fat%, total cholesterol, triglycerides and low density lipoproteins. Improvement on the lipid profile is due to increased hepatic lipase and lipoprotein at cellular levels which alters the metabolism and increased uptake of triglycerides by adipose tissues<sup>[16]</sup>. Yogic practices affect the body from the cellular levels which cause improvement of hematological parameters<sup>[17]</sup>. Controlled breathing increases the flow of vital energy to various organs in body which strengthen the voluntary and autonomic nervous systems<sup>[18]</sup>. There is an increase of RBC and Platelet counts following yoga which leads to erythropoiesis and thrombopoiesis<sup>[19]</sup>.

Aerobic dance are becoming popular in India since it improves both physiological and psychological well-being of an individual [20]. Slow and fast rhythms with controlling pace of the movement of the body segments demonstrates cardiovascular and metabolic benefits such as increased maximal oxygen consumption and improved aerobic capacity and increased energy production through mitochondrial respiration systems [21]. It seems interesting to determine the minimal intensity of regular physical exercise that would cause beneficial changes in lipid metabolism markers and prooxidant-antioxidant balance and would reduce the inflammatory response to exercise [22].

Aerobic exercises improve oxygen flow which carries red blood cells through the network of arteries and capillaries, the Oxygen demand and the production of carbon dioxide increase which demands for more RBCs and the oxygen consumption with generation of superoxide anion increase [23]. The body responds by increasing the number of RBCs and also in other ways to increase oxygen carrying capacity of the blood. The aerobic performance is enhanced by prolonged endurance training through improving oxidative capacity and increasing glycogen stores of the muscle cells [24].

Aerobics enhances the skeletal muscles to utilize lipids as opposed to glycogen and reducing plasma lipid levels [25]. Mechanism may unclear, hypothetically exercise increases enzyme named as lecithin cholesterol acyltrans (LCAT) aids to transfer the HDL cholesterol during exercises, there is an increase lipoprotein lipase activity depending on the energy expenditure while exercising [26]. Process of cholesterol removal is called as 'reverse cholesterol transport', which helps to remove cholesterol from circulation for disposal as a result of increases in LCAT and reduction of cholesterol ester transfer protein (CETP) [27]. Exercises increased enzymatic activity increase the ability of muscle fibers to oxidize fatty acids originating from plasma, VLDL cholesterol or triglycerides [28].

## 5. Conclusion

In conclusion, the overall results of this study suggest that a yoga programme has shown improvement in the LDL, HDL and total cholesterol whereas, aerobic provides improvement in the Triglycerides and hemoglobin values in sedentary individuals. However, additional, well-designed randomized controlled trials on this topic are needed.

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