

YOGA PRACTICE AND BIOCHEMICAL AND PHYSIOLOGICAL ALTERATIONS IN NORMAL SUBJECTS

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ABSTRACT

Objective: To assess the effect of 45 minute yogic kriya (Surya Namaskar and Kapalbhati) for 30 days on various physiological and biochemical parameters.

Methods: About 20 Nursing College students of the Santosh Medical University, Ghaziabad, between the age group 17 and 21 years volunteered to participate in the study. They were divided into two Groups A and B. Group A students including 10 students in each group were subjected to 30 days yoga kriya for 45 minutes for 6 days in a week. Statistical analysis: A student's t-test was used for comparing the means of pre- and post-yoga results of various parameters.

Results: No significant difference was found in systolic blood pressure, pulse, body mass index, hemoglobin except for fasting blood sugar and diastolic blood pressure ($p < 0.001$) among the yoga subject while comparing with baseline values and control.

Keywords: Yoga, Biochemical alterations, Physiological alterations, Surya Namaskar and Kapal Bhati.

INTRODUCTION

The efficacy of yoga and meditation as an adjunct to routine management of various diseases and disorders has been assessed from time to time by various researchers working in this area. It is an ancient technique, basically a practice of mental and physical exercise aiming to acquire good health in human beings. Yoga is gaining popularity and has the potential to make a significant contribution to the field of health sciences. Recently, scientists have explored its consistent beneficial effects on various biochemical, physiological, and psychological parameters, among the healthy and diseased human beings [1-5]. Madanmohan *et al.* have reported the effect of yoga practice in prevention and management of diabetic mellitus. He found a significant decrease in the fasting and post-prandial glucose level. Total cholesterol (TC), triglyceride (TG), and very low-density lipoprotein (LDL) were significantly decreased while high-density lipoprotein (HDL) was remarkably raised. Furthermore, all the lipid ratios were desirably raised [6]. In another group of non-insulin-dependent diabetes mellitus patients, also significant reduction was observed in the frequency of hyperglycemic index [7]. According to Chaya *et al.*, long-term yoga practice is shown to be associated with increased insulin sensitivity and attenuation of a negative relationship between body weight or waist circumference and insulin sensitivity [8]. A study was conducted by Yadav and Bal to find out the effect of yoga Asanas on selected hematological variables of female college students. Hematological parameters included erythrocytes, hematocrit, hemoglobin (Hb), platelets, erythrocyte sedimentation rate (ESR), etc. The experimental group showed lowering in albumin level and raised Hb level and ESR. The results of the study have revealed significant differences between control and experimental groups in relation to Hb but in the case of platelets insignificant difference was found between control and experimental groups [9]. Though few specific yoga Kriyas were reported to have no effect on the hematological parameters or hematological parameters. Study done by Bal gave some unusual results. An intervening attempt was done by him to determine the short-

term effects of Kapalbhati pranayama on hematological parameters of university level girls. No significant differences were found in Hb [10]. In a study done in 2015, to assess the effects of Chandra Nadi Pranayama on hematological parameters university level students between the age group 21 and 26 were included. No significant differences were found in Hb, TC, LDL-cholesterol, HDL-cholesterol and TG [11]. There are not enough data to say how effective yoga is in the management of hematological problems. Therefore, the role of yoga for assessing various biochemical hematological changes remains unclear. We, therefore, intend to have our study in this direction to assess the level of various physiological and biochemical parameters.

METHODS

Participants

20 nursing students from the Nursing College of Santosh Medical University, between the age group 17-21 were taken into study. All subjects volunteering for participation in the study had given their written informed consent. The study protocol was approved by our college ethical committee.

Subjects having any pathological condition and those who are on any pharmacological treatment from 3 months prior to the study were excluded from the study. Only healthy volunteers with daily regular lifestyle and are not involved in any sport regularly, were chosen to be part of the study.

Yoga program

The attendance register was maintained to confirm the presence of experimental subjects, participating in 45 minutes yoga session, for 6 days in a week for 30 days. The yoga activity was conducted in the college lawn of the medical college.

The procedure began with Surya Namaskar (sun salutation) with a session of 12 asanas (fixed postures) for 20 minutes, followed by

15 minutes Pranayam (breathing exercise including Anulome Vilome, Surya Bandana, Sheetal, and Bhramari). The session was ended with 10 minutes meditation.

Blood sampling

A sample collection was done initially at the baseline level and then after 30 days of completion of yoga tenure from both the group participants.

Fasting blood sample was taken from the forearm vein of all participants in the identical basal and fasting conditions. The samples were analyzed from the clinical laboratory of our hospital for Hb and fasting glucose level. Systolic blood pressure (SBP) and diastolic blood pressure (DBP), height and body weight were also measured at initial baseline level and then after 30 days of yoga. Hb was analyzed by spectrophotometric method [12]. While glucose oxidase-peroxidase method [13] was used for fasting glucose estimation.

Statistical analysis

All variables (SBP, DBP, pulse, fasting blood sugar, Hb and body mass index [BMI]) were expressed in mean, standard deviation and standard error of mean. The paired Student's t-test was applied in yoga performing Group A as well as control (not yoga performing) Group B. $p < 0.05$ was considered statistically significant. IBM Statistical Package for Social Sciences version 20 was applied for statistical analysis.

RESULTS

We could not obtain significant changes in various parameters such as SBP, pulse, Hb and BMI, between control and experimental groups, except for fasting blood glucose, and DBP which were found to be significantly decreased among experimental group post-yoga session. However, Hb in yoga group showed slightly lower value post-yoga ($p = 0.064$) while comparing to control group with their pre- and post-yoga values. However, this change is insignificant. Results are given in Table 1.

DISCUSSION

Results of the study clearly indicate that fasting blood and DBP are significantly decreased ($p < 0.001$ and 0.017 , respectively) in the post-yoga experimental group. While there was no change observed in the control group in their baseline values and after 30 days. Rest of the parameters including SBP was remaining unaffected in both Group A and B. Principal Finding of this trial was the decline in the level of blood glucose in post-yoga experimental subjects when compared with the baseline value and control group. Notable fact emerged from the study is that regular yoga practice does generate a noticeable increase in hypoglycemic effect. Various researchers working in the area have also reported that short-term yoga practice in patients with Type 2 diabetes bring about a marked drop in the glucose level [4,14]. However, the mechanism behind this to bring about these modifications is still not well understood.

The glycemic drop after regular yoga practice might also add a new alternative therapeutic focus in those clinical situations where a hike of this blood parameter is present. Lowered level of DBP was observed in the experimental group. However, no significant change was seen in SBP. Furthermore, it is well reported in the literature that people who follow the ancient practice of yoga may be getting an added health boost, fight high blood pressure also known as hypertension [15,16]. Though exact mechanism is not well understood but many people speculate that yoga is able to lower blood pressure so successfully because of the relaxation and mindfulness associated with it. Well it is a small sized and short-term study and these physiological, biochemical, etc. parameters were measured only once, can be considered as a limitation to the study. So advanced level yoga including large sample size and long-term tenure is needed to verify these preliminary results.

CONCLUSION

Present study substantiates some good results of the yoga training. Though all the tested parameters could not show desired changes and

Table 1: Baseline parameters in both groups

Group	N	Mean	SD	SEM	p value
SBP					
Yoga group					
Pre	10	113.10	11.56	3.65	0.322
Post		107.80	12.55	3.96	
Control group					
Pre	20	115.65	13.77	3.07	0.782
Post		114.60	6.52	1.45	
DBP					
Yoga group					
Pre	10	70.90	6.69	2.11	0.017
Post		66.90	8.35	2.64	
Control group					
Pre	20	73.45	8.85	1.98	0.553
Post		71.80	7.54	1.68	
Pulse					
Yoga group					
Pre	10	85.80	6.87	2.17	0.570
Post		83.70	12.14	3.84	
Control group					
Pre	20	89.70	11.89	2.66	0.718
Post		90.95	11.06	2.47	
Fasting blood sugar					
Yoga group					
Pre	10	106.50	6.38	2.01	<0.001
Post		98.40	4.57	1.44	
Control group					
Pre	20	100.25	9.12	2.04	0.623
Post		99.15	7.76	1.73	
Hb					
Yoga group					
Pre	10	9.95	1.03	0.32	0.064
Post		9.05	1.01	0.32	
Control group					
Pre	20	9.65	1.71	0.38	0.760
Post		9.80	1.83	0.40	
BMI					
Yoga group					
Pre	10	19.33	1.66	0.52	0.950
Post		19.31	1.50	0.47	
Control group					
Pre	20	21.30	3.11	0.69	0.791
Post		21.35	2.89	0.64	

By using paired Student's t-test. $p < 0.05$ was considered statistically significant. SD: Standard deviation, SEM: Standard error of mean, SBP: Systolic blood pressure, DBP: Diastolic blood pressure, Hb: Hemoglobin, BMI: Body mass index

they were statistically insignificant. The major findings were decreased fasting blood glucose and DBP. The decline in these parameters is compatible to the studies done earlier. This may attributed to the improved functioning of the body and mind as a consequence of regularized breathing and coordination of the body. Work done is representing the first attempt to explore short-term yoga practice on various afore said parameters. Further studies both short- and long-term tenure wise, are needed to verify the preliminary results as well as to assess their therapeutic applications as the adjunct therapy.

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