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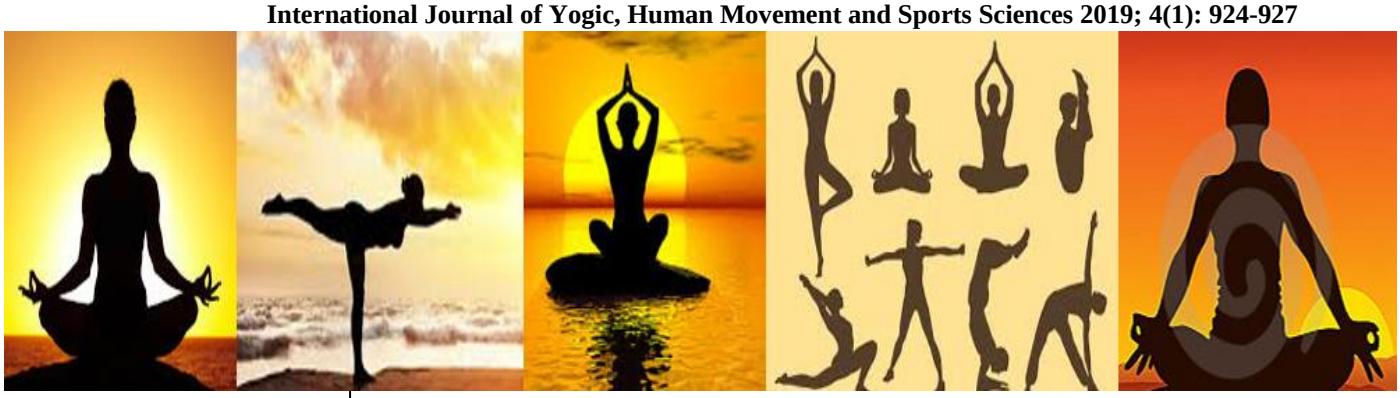

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Dr. Binod Chowdhary
Assistant Professor,
Seva Bharati Mahavidyalaya,
Kapgari, Jhargram,
West Bengal, India

Correspondence
Dr. Binod Chowdhary
Assistant Professor,
Seva Bharati Mahavidyalaya,
Kapgari, Jhargram,
West Bengal, India

Effect of three months yoga practices on biochemical parameters of government employers of jhargram

Dr. Binod Chowdhary

Abstract
Objective: To find out the effect of 45-minute yogic practice (Surya Namaskar, Asanas and Kapalbhati) for 90 days on selected biochemical parameters of Govt. employers of Jhargram.
Methods: About 38 Govt. Employers of Jhargram, between the age group 30 and 45 years volunteered to participate in the study. They were divided into two Groups A and B. Group A consisted of 19 Govt. employers who were subjected to 90 days yoga practices for 45 minutes for 5 days in a week. Group B consisted of 19 Govt. employers acted as control group.
Statistical analysis: Paired t-test was applied for comparing the means of pre- and post-yoga results of various parameters.
Results: No significant difference was found in Haemoglobin level but significance difference was found in fasting blood sugar (p<0.001) among the yoga subject while comparing with baseline values and control.

Keywords: Yoga, biochemical parameters, Surya Namaskar, Asanas and Kapal Bhati

Introduction
An increasing number of people with diabetes mellitus are turning to yoga in an effort to keep their condition under control and improve overall quality of life. It is well known that regular practice of yoga can help reduce levels of stress, enhance mobility, lower blood pressure and improve overall wellbeing. It is these benefits that many health experts believe can improve diabetes management and protect against other related medical conditions such as disease. The practice of yoga helps to co-ordinate the breath, mind and body to promote relaxation, develop breath awareness and provide a sense of inner peace.
It involves various body postures and movements (known as asanas), breathing techniques and meditation, which are all designed to promote physical comfort and mental composure.
The usefulness of yoga and meditation as an aid to management of various diseases and disorders has been assessed from time to time by various researchers working in the area. The whole system of Yoga is built on three main structures: exercise, breathing, and meditation. The exercises of Yoga are designed to put pressure on the endocrine systems of the body, thereby increasing its efficiency and total health. Scientists have been exploring its consistent beneficial effects on various biochemical, physiological, and psychological parameters, among the healthy and diseased human beings [1-3]. Madanmohan *et al.* have reported the effect of yoga practice in prevention and management of diabetic mellitus. They found 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]. Innes and Vincent did a study on non-insulin-dependent diabetes mellitus patients, observed significant reduction in the frequency of hyperglycaemic index [7]. According to Chaya *et al.*, long-term yoga practice is shown to be associated with increased insulin sensitivity and reduction of a negative relationship between body weight or waist circumference and insulin sensitivity [8]. Yadav and Baltried to find out the effect of yoga asana on selected haematological variables of female college students. Haematological parameters included erythrocytes, haematocrit, haemoglobin (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]. In a study some yoga Kriyas were reported to have no effect on the haematological parameters. Study done by bal gave some unusual results. An intervening attempt was done by him to determine the short-term effects of Kapal Bhati pranayama on haematological parameters of university level girls. No significant differences were found in Hb [10]. Ghosh and Chowdhary in their study found that regular practice of yoga and pranayama helped to increase the VO_2max of the college youths [12] in another study they also found practicing Surya Namaskar and some other asana put effect on body composition on college females [13]. To assess the effects of Chandra Nadi Pranayama on haematological 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 haematological problems. Therefore, the role of yoga for assessing various biochemical haematological changes remains unclear. We, therefore, intend to have our study in this direction to assess the level of biochemical parameters.

Methods

Subjects

38 Govt. Employers (Men) of Jhargram, Jhargram District, between the age group 30-45years were taken into this study. The scholars only considered those subjects who did not attain menopause. All subjects volunteering for participation in the study had given their written informed consent.

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

All the selected employers were randomly divided into two groups i.e, Group A and Group B of 19 employers each. Group A acted as experimental group and Group B acted as control group.

Yoga program

The attendance register was maintained to confirm the presence of experimental subjects, participating in 45 minutes yoga session, for 5 days in a week for 90 days. The yoga activity was conducted in the gymnasium.

The procedure began with Surya Namaskar (sun salutation) with a session of 12 asana (fixed postures) for 10 minutes, followed by 15 minutes Asanas and finally followed by 10 minutes Pranayam (breathing exercise including Anulom Vilom and Kapalbhati). The session ended with 10 minutes meditation (Trans Meditation). The entire training session had been given and monitored by the instructors of Art of Leaving society.

Blood sampling

A sample collection was done initially at the baseline level and then after 90 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 of Haemoglobin and fasting glucose level were analysed from the laboratory of our Physiology departmental initial baseline level and then after 90 days of yoga. Hb was analysed by spectrophotometric method, while glucose: oxidase-peroxidase method. C [15] was used for fasting glucose estimation.

Statistical analysis

The variables fasting blood sugar, Haemoglobin were expressed in mean, standard deviation and standard error of mean. The paired 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 Haemoglobin between control and experimental groups, but fasting blood glucose found to be significantly decreased among experimental group post-yoga session. However, Haemoglobin 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 Table 1.

Table 1: Baseline parameters in both groups

Group		N	Mean	SD	SEM	p value
Fasting Blood Sugar						
Yoga group						
Pre	*19*		107.42	6.18	2.01	<0.001
Post			99.40	4.21	1.44	
Control Group						
Pre		19	101.17	8.92	2.04	0.652
Post			98.95	6.76	1.73	
Haemoglobin						
Yoga group						
Pre		19	9.94	1.02	0.33	0.062
Post			9.07	1.01	0.33	
Control group						
Pre		19	9.45	1.45	0.37	0.690
Post			9.60	1.68	0.39	

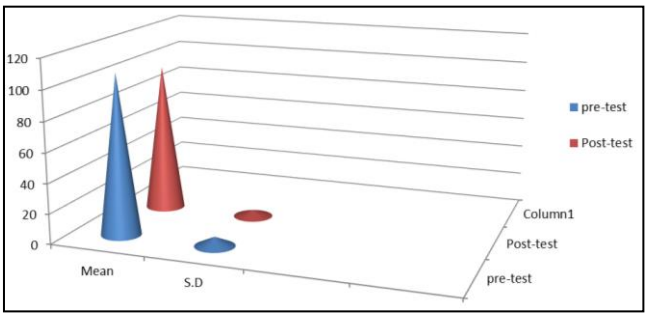

Fig 1: Representing the pre and post mean and standard deviation values of Experimental groups: Blood Sugar

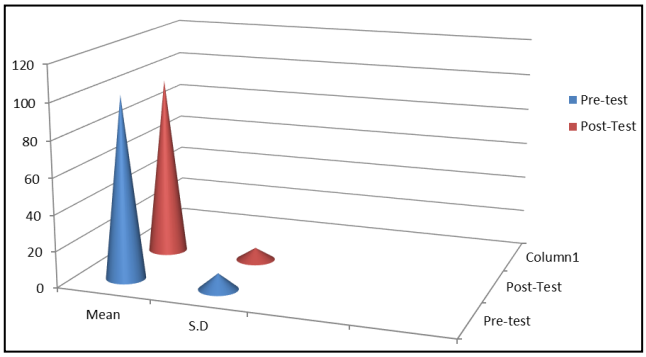

Fig 2: Representing the pre and post mean and standard deviation values of Blood Sugar: Control group

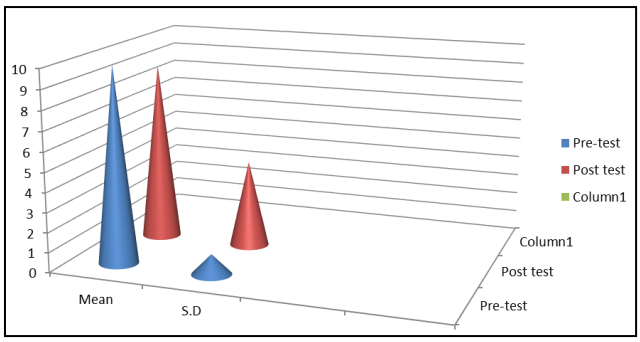

Fig 3: Representing the pre and post mean and standard deviation values of Experimental Groups: Hemoglobin

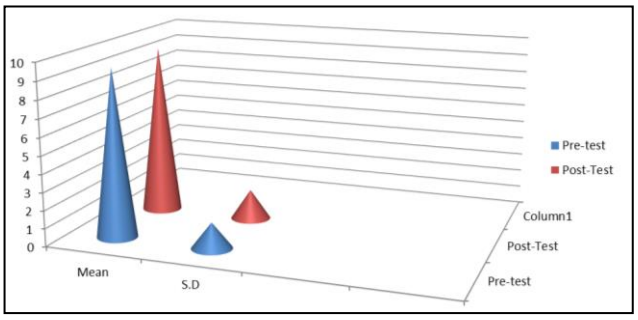

Fig 4: Representing the pre and post mean and standard deviation values of Hemoglobin: Control group

Discussion

Results of the study clearly indicate that fasting blood significantly decreased (p<0.001 respectively) in the post-yoga experimental group. While there was no change observed in the control group in their baseline values and after 90 days. Rest of the parameters including Major 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 hypoglycaemic 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 glycaemia 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 observed in the experimental group. Furthermore, it is well reported in the literature that people who follow the ancient practice of yoga may be getting a because of the relaxation and mindfulness associated with it. Well it is a small sized and short-term study and these biochemical 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 good results of the yoga training. The major finding was decreased fasting blood glucose. The decline in these parameters is compatible to the studies done earlier. This may have 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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