

# Study of biochemical profile before and after Sudarshan Kriya Yoga (SKY) in hypertensive patients

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## Abstract

**Background:** Hypertension became one of the significant health problem and a most common risk factor for Cardiovascular Disease. **Objectives:** The present study was aimed to find out the effect of two months practice of SKY in maintaining lipid profile and blood pressure among hypertensive patients. **Materials and Methods:** The present study was carried out at MNR Medical college and hospital situated in Sangareddy, Telangana. The 50 study subjects selected from the medicine ward of MNR Medical College, during the period from April 2017 to October 2017. **Results:** Significant decrease in SBP, DBP, total cholesterol, LDL, and a significant increase in HDL, and non significant changes in triglycerides and VLDL in hypertensive cases. **Conclusion:** SKY showed a significant statistical decrease in the values of lipid profile and blood pressure among hypertensive patients compared with normotensive subjects. So SKY appears to be a cost-effective alternative technique for controlling BP and improving lipid profile among hypertensive patients.

**Key Words:** Sudarshan Kriya Yoga (SKY), Pranayama, Omkar meditation, bhastrika.

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Received Date: 02/11/2017 Revised Date: 10/12/2017 Accepted Date: 03/01/2018

DOI: <https://doi.org/10.26611/1002516>

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	Accessed Date: 22 January 2018

## INTRODUCTION

Globally, Hypertension became one of the significant health problem and a most common risk factor for Cardiovascular Disease (CVD). It increases the risk of stroke, myocardial infarction, loss of vision, heart failure, and renal failure<sup>1,2</sup>. Worldwide, 26% of the population is suffering from hypertension and the prevalence of hypertension increasing day by day, especially in the developing countries, due to rapid urbanization,

unhealthy diet, and lifestyle changes have to lead to an increased rate of CVD in Southeast Asia, including India<sup>3,4,5,6</sup>. According to World health organization (WHO) report, India by 2020 CVDs will be the most significant cause of disability and death. Around 2.6 million people in India are predicted to die due to coronary heart diseases by 2020<sup>7,8,9</sup>. Ravi Shankar Guruji, the founder of the art of living foundation, designed a yogic package based on rhythmic breathing exercise called as Sudarshan Kriya Yoga (SKY). SKY is a technique which helps in relaxation and also improves uptake of oxygen by cells and in turn, regulates blood pressure in Hypertensive patients<sup>10</sup>. Several uncontrolled and controlled studies have demonstrated the short and long-term usefulness of yoga in the treatment of hypertension<sup>3</sup>. SKY may have therapeutic implication in the adjunctive (non-pharmacological) management of hypertension. So the present study was aimed to find out the effect of two months practice of SKY in maintaining lipid profile and blood pressure among hypertensive patients.

## MATERIALS AND METHODS

The present study was carried out at MNR Medical college and hospital situated in Sangareddy, Telangana state. A total of 50 study subjects were selected for this study and divided into controls (25 subjects) and cases (25 subjects) from the medicine ward of MNR Medical college and hospital, during the period from April 2017 to October 2017. This study approved by institutional ethical committee and investigations were carried out in the biochemistry laboratory, MNR Medical college and hospital situated in Sangareddy, Telangana state. Study subjects underwent art of living basic course of 6 days [20-22 hrs] Duration, consisting of pranayama, Omkar meditation, bhastrika, and Sudarshan kriya by a trained teacher. Following the course, home practice consists of 3 stage pranayama, bhastrika, Omkar meditation followed by short Sudarshan Kriya consisting of three rounds of cycles. Each round consists of long, medium, short cycles. The whole home practice takes around 25-30 minutes. All the patients were on prescribed medications. Observations about clinical examinations, blood pressure, and biochemical profile recorded before undergoing the course. These patients practiced pranayama, bhastrika, Sudarshan Kriya at home for two months under the guidance of art of living teacher. The same parameters repeated after two months of practice. BP measured in the sitting position after a 10-minute rest and the mean of three readings from the right arm recorded.

**Collection of Blood Sample:** Blood samples (about 5ml) were collected after a 12 hour overnight fast under aseptic conditions, dispensed into clean, dry tubes and allowed to clot and care is taken to procure serum. Informed consent was taken from study subjects for tests performed, and the study approved by the institutional ethical committee. Investigations are carried out on the serum samples by standard kit methods, and analyses performed on ERBA RA-150 semi-auto analyzer, in the biochemistry laboratory, MNR Medical college and hospital, Sangareddy.

**Parameters measured:** In the present study following parameters were investigated:

1. Total Cholesterol
2. Triglycerides
3. HDL- Cholesterol

Serum total cholesterol was measured by CHOD – PAP method<sup>11,12,13,14,15</sup>, Triglycerides were measured by GPO-Trinder method<sup>12,13,14,15,16</sup>, HDL- Cholesterol measured by Phosphotungstic acid method<sup>12,13,14,15,17</sup> and the values of LDL and Very-low-density lipoprotein cholesterol (VLDL) can be calculated by using Friedewald's equation<sup>12,13,14,15,18</sup> as follows;

- LDL – Cholesterol = total cholesterol – (HDL-cholesterol + triglycerides/ 5)

- VLDL-C = Triglycerides/5.

**Exclusion Criteria:** Cancer patients, Myocardial Infarction patients, Cerebrovascular accident patients, Epileptic patients, schizophrenia patients, pregnant women, Chronic Obstructive Pulmonary Disease (COPD) patients, and other primary illness patients, Diabetic Mellitus patients excluded from this study.

**Statistical Analysis:** The collected data were analyzed by SPSS software version 14.0. All results presented as the mean ± standard deviation (SD). A p-value of less than 0.0001 was considered significant.

## RESULTS

In the present study, total 50 subjects divided into two groups, 25 controls (normotensive) and 25 cases (hypertensive) with the age range of 30 – 50 years. Out of 25 normotensive controls 14 (56%) were males and 11(44%) females, and in 25 hypertensive cases, 16(64%) were males and 09(36%) females as shown in table 1.

**Table 1:** Gender-wise distribution of study subjects

Gender	Normotensive Subjects (%)	Hypertensive Patients (%)
Male	14(56%)	16(64%)
Female	11(44%)	09(36%)
<b>Total</b>	<b>25 (100%)</b>	<b>25 (100%)</b>

The systolic and diastolic blood pressure calculated separately. The mean ± SD of systolic blood pressure before undergoing SKY of normotensive subjects was 127.5±4.66 and mean ± SD of systolic blood pressure after experiencing SKY of normotensive subjects was 128.4±5.09. The mean ± SD of diastolic blood pressure before undergoing SKY of normotensive subjects was 85.04±5.07 and mean ± SD of diastolic blood pressure after undergoing SKY of normotensive subjects was 84.24±5.27. The systolic and diastolic blood pressure levels were not statistically significant before and after SKY among normotensive subjects (p>0.05) as shown in table 2.

**Table 2:** Mean values of BP before and after SKY in normotensive patients

Parameters	Mean±SD		Paired t-test	p-value
	Before	After		
SBP	127.5±4.665	128.4±5.099	1.189	>0.05 <sup>#</sup>
DBP	85.04±5.07	84.24±5.27	1.386	>0.05 <sup>#</sup>

NS<sup>#</sup> = Not Significant.

The mean ± SD of systolic blood pressure before undergoing SKY of hypertensive patients was 129.2±5.508 and mean ± SD of systolic blood pressure after undergoing SKY of hypertensive subjects was 122.2±5.174. The mean ± SD of diastolic blood pressure before undergoing SKY of hypertensive subjects was 88.16±5.289 and mean ± SD of diastolic blood pressure

after undergoing SKY of hypertensive subjects was 82.24±5.044 as shown in table 3. Table 3 shows the difference of mean in a study group at 0 and two months after continuously undergoing SKY along with medicines. A significant decrease recorded in systolic and diastolic blood pressure (p<0.0001).

**Table 3:** Mean values of BP before and after SKY in hypertensive patients

Parameters	Mean±SD		Paired t-test	P-Value
	Before	After		
SBP	129.2±5.508	122.2±5.174	29.7	<0.0001*
DBP	88.16±5.289	82.24±5.044	21.9	<0.0001*

S\* = Significant

The mean ± SD of lipid profile values among normotensive subjects undergoing before and after SKY workshop was not statistically significant (>0.05) as shown in table 4.

**Table 4:** Mean values of lipid profile before and after SKY in normotensive patients

Parameters	Mean±SD		Paired t-test	p-value
	Before	After		
TC	201±16.35	203.16±13.984	1.448	>0.05 <sup>#</sup>
TG	186.84±14.724	182.32±11.932	1.91	>0.05 <sup>#</sup>
HDL-C	37.16±5.624	38.36±3.604	1.571	>0.05 <sup>#</sup>
VLDL-C	37.4±2.915	36.52±2.417	1.979	>0.05 <sup>#</sup>
LDL-C	127.56±19.414	128.28±16.037	0.4106	>0.05 <sup>#</sup>

NS<sup>#</sup> = Not Significant.

Table 5 shows the Mean±SD levels of TC, LDL, and HDL before and after undergoing SKY workshop. The mean value of triglycerides before undergoing SKY was 190.8±12.05 and after SKY workshop was 189.6±12.53. The Mean ±SD of VLDL levels before undergoing SKY workshop was 38.32±2.42 and after the SKY workshop was 37.84±2.52. The levels of TG and VLDL were not statistically significant (p >0.05) as shown in table 5. The Mean±SD value of TC before undergoing SKY workshop was 204.2±11.13, and after SKY workshop was 191.28±11.84, there was statistically significant was observed among hypertensive patients (p <0.0001). The Mean±SD value of LDL before undergoing SKY workshop was 132±12.81, and after SKY workshop was 110.04±12.35, there was statistically significant was observed among hypertensive patients (p <0.0001). Moreover, the Mean±SD of HDL levels before undergoing SKY workshop was 33.88±3.12 and after SKY workshop was 43.4±2.87. The HDL levels significantly increased (p <0.0001) as shown in table 5.

**Table 5:** Mean values of lipid profile before and after SKY in hypertensive patients

Parameters	Mean ±SD		Paired t-test	p-value
	Before	After		
TC	204.2±11.13	191.28±11.84	18.99	<0.0001*
TG	190.8±12.05	189.6±12.53	0.892	>0.05 <sup>#</sup>
HDL-C	33.88±3.12	43.4±2.87	15.24	<0.0001*
VLDL-C	38.32±2.42	37.84±2.52	1.768	>0.05 <sup>#</sup>
LDL-C	132±12.81	110.04±12.35	27.42	<0.0001*

S\* = Significant, NS<sup>#</sup> = Not Significant.

## DISCUSSION

Sudarshan Kriya yoga is a unique stress relieving technique contains cyclic breathing process along with bhastrika, pranayama, and Omkar meditation. SKY is an advanced form of cyclical breathing at a variant rate, slow, medium and fast<sup>19</sup>. The present study reveals that significant decrease in Systolic blood pressure and diastolic blood pressure after the practice of SKY for two months in hypertensive patients. Similar findings were observed by Vedamurthachar A *et al.*<sup>20</sup> and Vaishali *et al.*<sup>21</sup>. The present study shows the significant decrease in total cholesterol, LDL, and a substantial increase in HDL, and non-significant changes in triglycerides and VLDL in hypertensive cases. Results of our study found significant improvement in lipid Profile parameters after SKY. The growth in the lipid profile parameters after yoga could be due to increased hepatic lipase and lipoprotein lipase at the cellular level, which affects the metabolism of lipoprotein and thus increase uptake of triglycerides by adipose tissues. Better ability to overcome stress can cite as a possible mechanism for improvement in lipid profile<sup>22</sup>. Thus our study reveals that SKY exerts its effect on various facets of blood pressure control and lipid profile. However, further extensive and long-term studies are needed to prove these findings and understand the underlying mechanism involved.

## CONCLUSION

SKY showed a significant statistical decrease in the values of lipid profile and blood pressure among hypertensive patients compared with normotensive subjects. So SKY appears to be a cost-effective alternative technique for controlling BP and improving lipid profile among hypertensive patients.

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Source of Support: None Declared  
Conflict of Interest: None Declared