

Effect of Yoga Based Lifestyle Intervention on Stress and Cardiovascular Risk in Hypertensive Patients

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Abstract

Original Research Article

Introduction: Yoga has been adopted as an approach to health within alternative medicine. Psychosocial stress greatly increases the risk of cardiovascular diseases like hypertension and coronary heart diseases. Atherogenic index of plasma (AIP) value increase in people at higher risk for coronary heart disease and inversely co-related with Low-density lipoprotein (LDL) particle size. Therefore a study was undertaken to assess the effect of yoga-based lifestyle intervention on cardiovascular disease risk factors (Stress and Atherogenic index of plasma) in hypertension subjects.

Materials and Methods: A randomized controlled trial in two hundred hypertensive subjects was done to assess the effect of Sudarshan Kriya Yoga (SKY) on stress and AIP. Total subjects were divided into two equal groups by simple random sampling. A hundred subjects who used to do SKY were included in the study group while a hundred non-practitioners of SKY were assigned in the control group. Recording of lipid profile and stress level was done by standard methods as baseline data and follow up was done after 3 months period. **Results:** Pre and post-intervention reflected a highly significant difference in stress level in the study group while observation of AIP was found non-significant between the groups. **Conclusion:** SKY reduces cholesterol and stress which can be used as a mass approach for the prevention & control of hypertension and other cardiovascular risks.

Keywords: Yoga Hypertensive Patients stress.

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INTRODUCTION

The word 'yoga' in Sanskrit means "to unite". The purpose of yoga is to bring man to the highest state of advancement on physical, mental and spiritual planes.¹ Recently, yoga has been adopted as an alternative method to medicine.² This includes mental and physical exercise to attain Samadhi, and correlate individual with the infinite.³ Sudarshan Kriya is a rhythmic breathing exercise including ujjayi pranayama with the special yogic package. SKY enhances the importance of prayers, asanas, meditation and interactive discussions along with a positive attitude which is based on 'Art of living knowledge keys [4].

There are many risk factors for cardiovascular diseases have been identified out of which most important ones are stress, hyperlipidemia, hypertension, abdominal obesity, and hyperglycemia. About 80% of cardiovascular diseases are mainly caused by

modifiable risk factors i.e. obesity, physical inactivity, high blood pressure, high Low-density lipoprotein (LDL) cholesterol, low high-density lipoprotein (HDL) cholesterol, uncontrolled stress, and anger, smoking[5].

Stress is an unavoidable part of human life which was first employed in the 1930s by the endocrinologist Hans Selye[6]. Stress is "a physical or psychological stimulus that affects both physical and mental health. Stress causes hormonal changes, biochemical changes. Stress is a major risk factor for cardiovascular diseases like hypertension and coronary heart diseases (CHD).⁷ In addition to stress, deposition of LDL cholesterol, fat and other substances on the arterial walls results in sluggish blood flow which raises the blood pressure and produces malfunction in the heart.

AIP can be described as a Log of TG divided by HDL. It has recently been proposed as a marker of plasma atherogenicity because it is increased in people at higher risk for coronary heart disease and inversely co-related with LDL particle size. The AIP has been used for detecting cardiovascular disease risk. AIP less than 0.11 (low risk), AIP between 0.11 to 0.21 (intermediate risk), AIP more than 0.21 (High risk) is used for interpretation of cardiovascular diseases risk [8].

There are many studies suggested the effect of SKY on the level of cholesterol after various time intervals. A significant decline was noted in total cholesterol (TC) & LDL and an increase in HDL cholesterol were observed. These findings are suggestive that SKY enhances the good cholesterol, therefore regular practice may be an effective tool in the prevention of hypertension and CHD [8-11]. However there is no such study was undertaken in the north-western part of Rajasthan. Therefore, it was planned to undertake a study to illustrate and confirm the effect of SKY on stress level and lipid profile among hypertensive subjects.

MATERIALS AND METHODS

In the present study, two hundred hypertensive subjects of both genders, age group (30-70 years) was included. The study was done in the Department of Physiology, Sardar Patel Medical College, and Bikaner. All the subjects were on prescribed antihypertensive medications. They were divided into two equal groups as study and control groups by simple random sampling consisting of 100 subjects in each. The study group was asked to do ‘Sudarshan Kriya Yoga’ one hour daily or at least five times a week for continuous three months after proper training by trained teachers.

All the subjects participated voluntarily in the study. Exclusion criteria were any major illness other than hypertension ie. Cancer, heart disease, arthritis, asthma, diabetes mellitus, ulcer and pregnancy in women. Informed written consent was taken from participants for tests performed and SKY training. The plan of study was approved by the ethical committee of Sardar Patel Medical College, Bikaner.

Before starting the intervention, baseline parameters such as Systolic blood pressure (SBP), Diastolic blood pressure (DBP), Stress level and AIP were recorded for every patient. Blood pressure was measured by using sphygmomanometer in a sitting position. Fasting blood sample (2 ml venous blood) was taken for estimation of Lipid profile (Triglycerides (TG), High-density lipoprotein cholesterol (HDL) and Low-density lipoprotein cholesterol (LDL). The stress level was measured using a perceived stress scale given by Sheldon Cohen. The same set of observations was repeated after 3 months of the study period.

RESULTS

Baseline characteristics of the subjects in the study and control groups are given in table 1. Systolic and diastolic blood pressure, lipid profile (TG, HDL & LDL) is compared between both the groups. The associations between all the clinical parameters were found non-significant. (p>0.05).

Table 2 depicts post-intervention biochemical parameters among both the groups. Reduction in Systolic and diastolic blood pressure, and lipid profile was recorded in the study group but almost no changes were observed in the control group. The differences in the mean after 3 months was found statistically significant (p<0.05).

Table 3 shows the mean±SD score of AIP index at baseline and it was found 0.564±.112 and 0.566±.124 in study and control group respectively. The association between study and control group was non-significant (p>0.05).

AIP index score after 3 months was observed 0.559±.110 and 0.577±.130 in study and control group respectively. The association between study and control group was non-significant (p>0.05) (Table 4).

Comparison of stress level at baseline and after 3 months was done in both the groups. A statistically highly significant (p<0.001) association was observed in the study group while a non-significant (p>0.05) relationship was found in the control group (Table 5 & 6).

Table-1: Clinical parameters at pre-intervention between Study and Control Group

Parameters		Study Group		Control Group		t	p value
		Mean	SD	Mean	SD		
Blood Pressure (mmHg)	Systolic	137.36	8.11	138.24	8.94	0.516	0.607 [#]
	Diastolic	92.48	6.24	91.12	7.51	0.985	0.327 [#]
Lipid Profile (mg/dl)	TG	147.64	28.78	151.24	41.3	0.506	0.614 [#]
	HDL	40.3	5.15	38.72	3.53	1.789	0.077 [#]
	LDL	155.63	43.9	142.75	37.32	1.581	0.117 [#]

[#]Non-significant (p>0.05), Unpaired t test

Table-2: Clinical parameters at post-intervention between Study and Control Group

Parameters		Study Group		Control Group		t	p value
		Mean	SD	Mean	SD		
Blood Pressure (mmHg)	Systolic	130.31	7.13	139.18	7.58	0.441	0.041*
	Diastolic	88.35	5.21	90.14	8.45	0.925	0.043*
Lipid Profile (mg/dl)	TG	125.71	27.61	151.21	42.25	0.301	0.025*
	HDL	43.24	4.11	37.48	4.49	1.015	0.051*
	LDL	142.51	41.7	143.53	36.28	1.251	0.042*

*Significant (p<0.05), Unpaired t test

Table-3: Comparison of AIP scores at Pre intervention between Study and Control Group

Groups	N	Mean	Std. Deviation	Std. Error Mean	Sig. (2-tailed)
Study Group	100	.564	.112	.010	.298#
Control Group	100	.566	.124	.011	

#Non-significant (p<0.05), Unpaired t test

Table-4: Comparison of AIP scores at Post intervention between Study and Control Group

Groups	N	Mean	Std. Deviation	Std. Error Mean	Sig. (2-tailed)
Study Group	100	.559	.110	.011	.554#
Control Group	100	.577	.130	.013	

#Non-significant (p<0.05), Unpaired t test

Table-5: Comparison of stress level at baseline and after 3 months in study group

Stress	Mean	N	Std. Deviation	Std. Error Mean	t	p value
Baseline	23.48	100	5.21	0.52	20.30	0.00*
After 3 Months	9.86	100	3.25	0.33		

*Highly Significant (p<0.01)

Table-6: Comparison of stress level at baseline and after 3 months in control group

Stress	Mean	N	Std. Deviation	Std. Error Mean	t	p value
Baseline	23.57	100	5.09	0.51	-1.64	0.10 ^s
After 3 Months	23.75	100	5.02	0.50		

^sNon-significant (p>0.05)

DISCUSSION

There are many alternative medicines has been tried for the treatment of hypertension. Various herbal remedies, non-herbal remedies like yoga have been tried & tested and some of them seem to have antihypertensive effects. Role of Yoga acts as an adjuvant. SKY is a standardized package of yoga which is based on intervention applied across the world and a need was felt to study its effects in reducing blood pressure [12].

It has been found that there is a significant reduction in SBP, DBP, Heart rate (HR) as well as respiratory rate after the 12-week practice of SKY. It is based on the mechanism of creating balance in the autonomic nervous system by parasympathetic dominance and reduced sympathetic action [13]. At the time of breathing exercises, synchronization in the hypothalamus and the brainstem produce parasympathetic response [14]. Slow ujjayi breathing increase activity of parasympathetic system & enhance the activity of vagal tone such as respiratory sinus arrhythmia & heart rate variability. It leads to decreases chemoreflex sensitivity & improves baroreflex sensitivity [15-17] oxygenation & exercise tolerance

[18]. Contraction of laryngeal muscles along with partial closure of glottis also stimulates vagal afferents [15].

Many studies have shown the association of AIP and cardiovascular risk [8,19-21]. In the present study, the effect of Yoga on AIP was assessed. There was no significant difference observed at baseline and after 3 months between both the groups. There are many studies conducted in the past which shows a positive effect of yoga on the reduction of stress level and are in the line with the present study [22-25]. Further studies in the wider geographical region and with larger sample size are recommended to generalize the results.

CONCLUSION

Sudarshan Kriya Yoga has its role in reducing the systolic and diastolic blood pressure and improves lipid profile. It creates a balance between autonomic nervous system functions by parasympathetic dominance and decreased sympathetic activity. The study may prove to be useful in the management of hypertension and in patients who are at risk of cardiac diseases or live with a morbid life along with

psychosomatic & lifestyle-related diseases. Further research is needed to know up to what extent SKY can play its role in prevention as well as management of cardiac and mental health.

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