

Original Research Article

Role of yoga therapy on lipid profile in patients of hypertension and prehypertension

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ABSTRACT

Background: Hypertension and dyslipidemia are one of the most prevalent cardiovascular disorders affecting 20% of world's population. There is emerging data that yoga therapies may be useful in managing modest elevations in BP. Yoga, specific yogic exercise (Sudarshan kriya) taught as a training protocol under Art of living course (AOL), is especially attractive as a candidate therapy in the management of elevated BP because of its combination of gentle physical activity. Hence, this study was undertaken to compare the effects of SDK on blood lipid levels.

Methods: A total of 300 patients of hypertension and prehypertension were taken in the study where control group were given drugs treatment and life style modification and yoga group additionally had undergone yoga training. Lipid levels were estimated in both groups at entry, 06 months and 12 months and analyzed.

Results: Lipid levels at entry were same in both while the yoga therapy group showed decrease in TG, LDL and VLDL at six months and 12 months but decrease was not significant. HDL levels showed significant increase in yoga group ($P < 0.05$) at six months which was maintained at 12 months more so in diabetic patients.

Conclusions: Yoga therapy has beneficial effect on serum lipid levels and should be included in therapy along with other measures.

Keywords: Dyslipidemia, Hypertension, Yoga

INTRODUCTION

Nowadays the domain of pure physical disorders is narrowing and that of psychosomatic disorders is ever increasing and hypertension tops the list as one of the earliest clinical manifestations. Hypertension is one of the most prevalent cardiovascular disorders affecting 20% of world's population.¹ Sympathetic nervous hyper-tonicity may be responsible for activation of the renin-angiotensin system, and both of these together may play an important role in the elevation of BP.² Stress has been implicated as one of the major causes of essential hypertension by producing large amount of vasoconstrictor hormones that

increase BP.³ Stress is significant problem of World as it affects physical, mental, behavioral and emotional health. Yoga has been reported to control stress and found to be beneficial in treating stress related disorders, improving autonomic functions, lower blood pressure, increase strength and flexibility of muscles, improve the sense of well-being, slow ageing process, control breathing, reducing signs of oxidative stress & improving spiritual growth. Yoga is reported to reduce stress and anxiety, improves autonomic functions by triggering neurohormonal mechanisms by the suppression of sympathetic activity.⁴ There are several non-pharmacological methods of controlling high blood

pressure. Physical activity, yoga, relaxation techniques and reduction in daily salt intake have been proved to modify the risk factors responsible for the development of hypertension. The physiological effects of Yoga training that have been previously reported include the inhibition of body weight gain, reduction in cholesterol levels and blood pressure along with improvement in immune function as well as beneficial psychological effects.⁵⁻¹⁰ Obesity, hypertension and dyslipidemia are one of the major risk factor for cardiovascular disease. The characteristic features of Indian dyslipidemia are a high plasma triglyceride concentration, low high-density lipoprotein (HDL) concentration and increased concentration of small dense low-density lipoprotein (LDL) particles.¹¹ Caloric restriction and weight loss for the overweight individual have been of proven therapeutic value. However, there is no consensus on the ideal dietary composition for these patients. Genetic factors and the lipid phenotype of the individual determine the way the plasma lipid profiles change in these patients.¹² Lifestyle changes, including increased physical activity and dietary modifications have, however, been the cornerstones of management of dyslipidemia in diabetes.¹³

Mahajan conducted a study on subjects with mild to moderate hypertension and reported that yoga can play an important role in risk modification for cardiovascular diseases.¹⁴ Another study had reported a better lipid profile in long and medium-term meditators when compared to nonmeditators.¹⁵ In view of these observations, the present study was undertaken to assess the effect of yoga practice on the lipid profile in patients with hypertension prehypertension.

Yoga, specific yogic exercise (Sudarshan kriya) taught as a training protocol under Art of living course (AOL), is especially attractive as a candidate therapy in the management of elevated BP because of its combination of

gentle physical activity, regulated breathing and meditation. SDK is powerful rhythmic breathing technique that is said to work on mental, physical, and spiritual level. This breathing technique was founded in 1982 by Sri Sri Ravi Shankar. The word “yoga” itself is derived from the Sanskrit word meaning “union,” which is a philosophy that connects the body, breath, and mind to maintain energy balance. It increases longevity and has therapeutic as well as rehabilitative effects. Shavasana relaxes the body because the muscles are completely relaxed voluntarily. Hence, the current study was undertaken to compare the effects of SDK on lipid profile in hypertensives and pre hypertensives.

METHODS

A total of 300 patients out of which 200 were with primary hypertension stage (systolic BP 140- 165 mm of hg diastolic BP 90- 105) and 100 patients with prehypertension or high normal Blood pressure 120-139/80-89 mm of hg) were randomize to either of 2 groups. Hypertensive drugs and statins were usually optimized in first 03 months and not increased after 03 months till end of study except when required otherwise in both groups. The first group will continue to receive the prescribed drugs and life style modification as advised. The second group was taught simple yogic exercise by a trained preacher of AOL foundation. This training included intensive supervised phase two-hour training sessions for 02 weeks followed by self-performed yogic exercise till end of study (one year). Lipid profile was done at beginning, six months and at end of study. Patients suffering from other disorders like liver disease, pulmonary diseases, malabsorption, thyrotoxicosis, alcoholism, Pregnancy/lactating and non-co-operative patients were excluded from the study.

RESULTS

Table 1: Significance of difference between the mean lipid profile levels of the hypertensive (diabetic) yoga and control groups at entry level.

Lipid profile	Yoga (n=18)		Control (n=22)		SE D	Mean difference (Y-C)	df	t value	P
	Mean	SD	Mean	SD					
TC	223.83	58.43	218.83	60.24	18.89	5.00	38	0.26	0.79
LDL	161.52	40.66	159.22	38.66	12.58	2.3		0.18	0.86
HDL	38.74	10.87	39.12	11.57	3.58	-0.38		0.11	0.92
VLDL	41.67	8.62	41.84	19.84	6.135	-0.17		0.03	0.98

A total of 200 patients of hypertension were included. Among these 145(72.5%) were males and 55(27.5%) were female patients. The age range of patients was from 25 to 65 years with mean age of 43.8 years. Amongst these 40(20%) patients were found to be diabetic and 160(80%) were non diabetic. In protocol 1 where hypertensive patients were included 40(20%) respondents

were found to be suffering from another co morbid disease, i.e. diabetes and 160(80%) were non diabetic. Lipid profile values of all the patients were assessed at entry level, six months and one year.

It is evident from Table 1 and 2 that lipid levels were not significantly different in yoga group and control group.

Table 2: Significance of difference between the mean lipid profile levels of the hypertensive (non-diabetic) yoga and control groups at entry level.

Lipid profile	Yoga (n=82)		Control (n=78)		SE D	Mean difference (Y-C)	Df	t value	P
	Mean	SD	Mean	SD					
TC	201.45	62.33	209.74	57.45	9.49	-8.29	158	0.87	0.38
LDL	139.44	37.35	139.63	38.52	5.99	-0.19		0.03	0.97
HDL	43.24	9.66	42.79	11.18	1.65	0.45		0.27	0.79
VLDL	39.12	20.58	38.41	18.64	3.11	0.71		0.23	0.82

Although, at six months, the lipid levels (TC, LDL, VLDL, TG) decreased in yoga group but the mean differences was not statistically different both in diabetic and non diabetic patients ($p>0.05$) table 3 and 4. HDL

levels increased in yoga group more so in diabetic patients and these were statistically significant ($p<0.05$) Table 3 and 4. Further these differences were maintained at 12 months and statistically significant ($p<0.05$). Table 5 and 6.

Table 3: Significance of difference between the mean lipid profile levels of the hypertensive (diabetic) yoga and control groups at six months.

Lipid profile	Yoga (n=18)		Control (n=20)		SE D	Mean difference (Y-C)	Df	t	p
	Mean	SD	Mean	SD					
TC	188.45	60.43	191.64	62.84	20.05	-3.19	6	0.16	0.87
LDL	109.67	37.83	114.64	39.56	12.59	-4.9		0.39	0.64
HDL	58.64	8.45	43.83	11.65	3.33	0.81		0.43	0.04
VLDL	27.52	15.23	29.73	17.28	5.31	-2.2		0.42	0.68

Table 4: Significance of difference between the mean lipid profile levels of the hypertensive (non-diabetic) yoga and control groups at six months.

Lipid profile	Yoga (n=78)		Control (n=68)		SE D	Mean difference (Y-C)	Df	t value	P
	Mean	SD	Mean	SD					
TC	178.44	58.24	181.44	52.45	9.23	-3.00	4	0.32	0.75
LDL	115.42	37.45	118.94	35.24	6.05	-3.52		0.58	.56
HDL	59.55	8.34	42.74	10.26	1.54	1.81		1.17	0.03
VLDL	27.64	18.55	29.65	16.22	.90	-2.01		0.67	0.49

Table 5: Significance of difference between the mean lipid profile levels of the hypertensive (diabetic) yoga and control groups at twelve months.

Lipid profile	Yoga (n=15)		Control (n=20)		SE D	Mean difference (Y-C)	Df	T	P
	Mean	SD	Mean	SD					
TC	186.35	62.56	188.64	58.44		-2.29	3	0.11	0.91
LDL	108.67	35.43	111.84	38.55		-3.17		0.25	0.80
HDL	60.73	10.44	44.42	12.63		1.31		0.43	0.03
VLDL	28.52	12.32	29.73	16.56		-1.21		0.24	0.81

Table 6: Significance of difference between the mean lipid profile levels of the hypertensive (non-diabetic) yoga and control groups at twelve months.

Lipid profile	Yoga (n=69)		Control (n=59)		SE D	Mean difference(Y-C)	df	t	p
	Mean	SD	Mean	SD					
TC	179.86	56.54	182.85	54.63	9.87	-2.9	26	0.30	0.76
LDL	117.80	34.33	118.56	36.54	6.27	-0.76		0.12	0.90
HDL	58.23	10.44	47.43	12.63	2.04	0.80		0.39	0.04
VLDL	27.58	15.63	28.38	15.88	2.79	-0.80		0.29	0.81

In Protocol 2 in prehypertension patients, at entry level lipid levels of both control and yoga group were not statistically different as shown in table 7 and 8($p>.05$) At six months and one year like in hypertensive protocol here lipid levels (TC, TG, VLDL, LDL) decreased in

yoga group as compared to control but it was not statistically different (table 9 to 10). HDL levels increased in both diabetic and non-diabetic group and were statistically significant in non diabetic group (yoga group) at six months and levels were maintained at one year. ($p<.05$) Table 11 and 12.

Table 7: Significance of difference between the mean lipid profile levels of the pre hypertensive (diabetic) yoga and control groups at entry level.

Lipid profile	Yoga (n=7)		Control (n=5)		SE D	Mean difference (Y-C)	df	t	p
	Mean	SD	Mean	SD					
TC	217.74	79.53	219.58	67.48	43.88	-1.84	10	0.04	0.97
LDL	156.47	62.74	154.73	69.32	18.08	1.74		0.09	0.92
HDL	39.63	10.24	42.47	13.68	6.87	2.84		0.41	0.69
VLDL	38.93	18.74	40.65	19.65	11.19	-1.72		0.15	0.89

Table 8: Significance of difference between the mean lipid profile levels of the pre hypertensive (non-diabetic) yoga and control groups at entry level.

Lipid profile	Yoga (n=43)		Control (n=45)		SE D	Mean difference (Y-C)	df	t	P
	Mean	SD	Mean	SD					
TC	206.23	62.54	208.23	57.59	12.8	-2.0	86	0.16	0.88
LDL	127.43	54.76	131.35	61.74	6.79	-3.9		0.31	0.56
HDL	52.43	12.45	49.74	9.63	2.37	2.69		1.14	0.26
VLDL	36.22	16.76	34.75	18.64	3.78	1.47		0.39	0.69

Table 9: Significance of difference between the mean lipid profile levels of the pre hypertensive (diabetic) yoga and control groups at six months.

Lipid profile	Yoga (n=7)		Control (n=5)		SE D	Mean difference (Y-C)	df	t	P
	Mean	SD	Mean	SD					
TC	195.76	53.76	213.75	56.84	32.21	-17.99	10	0.56	0.59
LDL	138.54	40.23	148.73	41.23	23.79	-10.19		0.43	0.68
HDL	59.35	12.43	40.75	12.56	7.31	1.6		0.42	0.05
VLDL	35.67	17.34	38.24	17.45	10.18	-2.57		0.25	0.81

Table 10: Significance of difference between the mean lipid profile levels of the pre hypertensive (non-diabetic) yoga and control groups at six months.

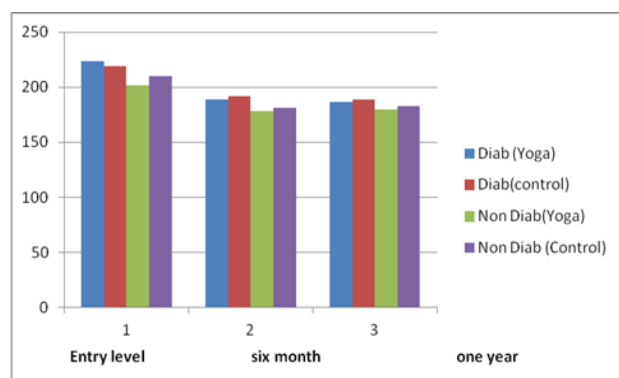
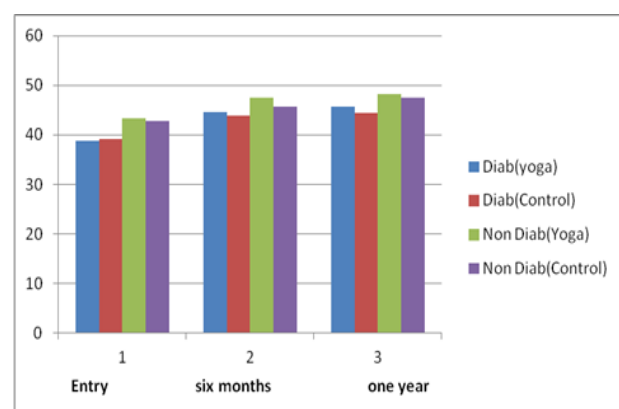
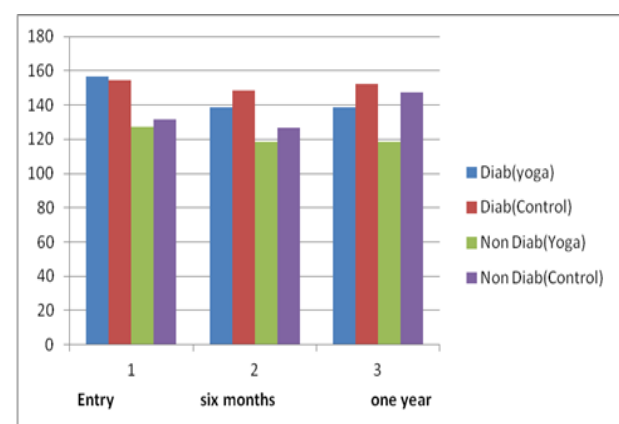
Lipid	Yoga(n=36)		Control (n=33)		SE D	Mean difference (Y-C)	df	t	p
	Mean	SD	Mean	SD					
TC	184.37	53.57	193.56	56.34	13.23	-9.19	67	0.69	0.49
LDL	118.46	43.22	126.74	58.32	12.29	-8.28		0.67	0.50
HDL	63.24	10.47	50.28	9.35	2.39	9.96		4.15	0.02
VLDL	32.67	15.37	33.64	18.36	4.06	0.97		0.24	0.81

Table 11: Significance of difference between the mean lipid profile levels of the pre hypertensive (diabetic) yoga and control groups at twelve months.

Lipid profile	Yoga (n=7)		Control (n=4)		SE D	Mean difference Y-C)	df	t	P
	Mean	SD	Mean	SD					
TC	193.45	57.34	215.34	59.34	36.36	-21.89	9	0.60	0.56
LDL	138.47	43.13	152.32	42.34	25.07	-13.85		0.55	0.59
HDL	60.32	12.85	41.74	10.23	7.55	5.58		0.74	0.05
VLDL	38.24	16.35	37.24	15.35	10.04	1.00		.10	0.92

Table 12: Significance of difference between the mean lipid profile levels of the pre hypertensive (diabetic) yoga and control groups at twelve months.

Lipid Profile	Yoga (n=32)		Control (n=30)		SE D	Mean difference (Y-C)	df	t	p
	Mean	SD	Mean	SD					
TC	179.35	51.35	197.23	62.45	14.48	-17.88	60	1.23	0.22
LDL	118.39	35.23	140.24	42.30	9.862	-21.85		2.22	.03
HDL	60.36	11.37	50.24	11.63	2.92	5.12		1.75	0.04
VLDL	30.27	16.32	38.13	20.74	4.72	7.86		1.66	0.10

**Figure 1: Total cholesterol at three assessment levels.****Figure 2: HDL levels at three assessment levels.****Figure 3: LDL levels at three assessment levels.**

DISCUSSION

The age range of patients was from 25 to 65 years with mean age of 43.8. Amongst these 40(20%) patients were found to be diabetic and 160(80%) were non-diabetic. The lipid levels in both prehypertensive patients and hypertensive patients were not significantly different at entry level in study (Figure 1). With Yoga therapy although VLDL, LDL, TG reduced at 06 months and maintained at 12 months but was significantly reduced from control group ($P>.05$) (Figure 2). While HDL levels were same in both control and yoga group at entry level but increased significantly in yoga group at 06 months and this increase was significantly maintained at 12 months in yoga group as compared to control group receiving all the medications as in yoga group including life style modification in both group thereby reducing bias (Figure 3). These results are consistent with study by Nisha et al on diabetic and dyslipidaemic patients, where yoga therapy lead to improvement in lipid profile.¹⁶ Also in a study conducted by Jayram et al in obese patient's yoga therapy showed significant effect on lipid profile.¹⁷

CONCLUSION

The results of the present study indicate that Yoga therapy leads to a significant reduction of the Lipid Profiles of the hypertensive and Pre-hypertensive patients of the Yoga and control groups at six months and one year indicating significant advantage of Yoga Therapy over the conventional treatment regime. However, HDL levels of the non diabetic Pre hypertensive patients was found to increase significantly in comparison to the control group and the difference persisted even after one year. Considered together, the present results implicate an advantage of incorporation of Yoga Therapy in the treatment regime of dyslipidemia.

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Conflict of interest: None declared

Ethical approval: The study was approved by the institutional ethics committee

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