Effect of Home-Based Yoga Intervention on Lipid Profile in Hypertensive Patients

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KEYWORDS
Yoga; hypertension; lipid profile; low density lipoprotein

ABSTRACT

Introduction: India has been reported to be the diabetes capital of the world and a control in lipid profile could go a long way in reducing cardiovascular adverse events in the population. The present study was aimed at assessing if home based yoga interventions could improve the lipid profile of the study participants in the intervention group. **Materials and methods**: The present study was a non-randomised controlled trial, conducted for a period of two years, from December 2021 to December 2023 at a tertiary care teaching institute in Indore. Total 300 participants were divided into four groups (two intervention and two control groups) that were followed up for three months to assess the changes in their lipid profile after yoga intervention in the intervention group. **Results**: The study participants from the intervention group reported a significant improvement in their lipid profile parameters, namely triglycerides ($P < 0.05$), low density lipoprotein ($P < 0.05$) and high-density lipoprotein ($P < 0.01$). **Conclusions**: Yoga's ability to improve the lipid profile makes it a promising non-pharmacological option for hypertension management
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Introduction: Yoga therapy is an emerging treatment modality to control high BP. Yoga does not require much financial outlay or any special equipment and has had no reported ill effects. In everyday practice will improve health status and the need of medicine to control BP can be reduced with adequate medical supervision. Various researches on the effectiveness of selected yoga were conducted among hypertensive patients which turn reveals the effectiveness of alternative and complementary therapies for patients with hypertension.

Hypertension is a chronic medical condition characterized by consistently elevated levels of arterial blood pressure. It is a significant public health concern worldwide, affecting an estimated 1.13 billion people globally according to the World Health Organization (WHO). Hypertension is defined by sustained elevated blood pressure levels, typically classified as systolic blood pressure (SBP) of 140 mmHg or higher and/or diastolic blood pressure (DBP) of 90 mmHg or higher. The etiology of hypertension is multifactorial, involving genetic, environmental, and lifestyle factors. Primary (essential) hypertension, which accounts for approximately 90-95% of cases, has no identifiable cause but is associated with risk factors such as age, family history, obesity, physical

inactivity, and high salt intake. Secondary hypertension, accounting for 5-10% of cases, results from underlying conditions such as kidney disease, endocrine disorders, or the use of certain medications.

India is one of the fast developing economy, bringing new employment and related opportunities along with an improved life style, coupled with exposure to the Western lifestyle. There is an increasing trend of lifestyle diseases, with some reports mentioning India to be the diabetes capital of the world [1]. A recent report by World Health Organization (WHO) has revealed that nearly half of India's population is physically unfit [2].

The aim of this study was to determine whether practicing yoga at home leads to significant improvements in lipid profile as compared to non-yoga practitioners. To compare these changes among hypertensive patients at baseline and after invention of 3 months yoga program.

Materials and methods: The present study was conducted in the Department of Physiology, Index Medical College and Research Institute, Indore (Madhya Pradesh), a constituent tertiary care teaching institute/ Medical College under Malwanchal University, Indore (Madhya Pradesh). The present study was a non-randomised controlled trial, conducted for a period of two years, from January 2022 to January 2024.

As per previously published estimates in the available literature, around 26% of the adult population in India is hypertensive. The population of Central India was considered to have a prevalence of hypertensive individuals similar to that of national average for the study purpose. An absolute error of 5% was accounted while estimating the sample size. The sample size was thus calculated using the appropriate sample size formula:

$$N = z^2pq/ d^2$$

Where z= 1.96 at 95% confidence interval, p = 0.26, q= 1 – p = 0.74, d= Absolute error set at 5%
Hence, sample size = 295

Total 300 participants were further divided into four groups on the basis of the BMI at enrolment and intervention:

Group I: intervention group (practiced yoga) hypertensive with BMI≥25 kg/m2 N=75.
Group II: intervention group (practiced yoga) hypertensive with BMI≤24 kg/m2 N=75.
Group III: control group (did not perform yoga) hypertensive with BMI≥25 kg/m2 N=75.
Group IV: control group (did not perform yoga) hypertensive with BMI≤24 kg/m2 N=75.

The study participants were enrolled on the basis of the following inclusion criteria:

- Age group: 20 to 70 years.
- BP criteria: SBP of 130 to 159 mm Hg or DBP of 85 to 99mm Hg.
- Three months or more of prescribed antihypertensive medication or without previously prescribed anti-hypertensive medications.

Participants with the following characteristics were excluded from the study:

- Participants with a medical history of any other disease known to affect the autonomic cardiac function, neurological diseases, metabolic disorders, or endocrine disorders.
- Pregnant women to avoid any pregnancy related risks.
- Known secondary cause of hypertension (self-reported).
- Hypertension (SBP ≥160 mm Hg or DBP ≥100 mm Hg).
- Those who were already engaged in practicing any type of relaxation technique/ Yoga or physical exercise.

The intervention was divided into two parts: a) two-hour yoga training for five days, and b) 90 days of at-home self-practice of yoga (with a 30-minute session each day). Group I and Group II, the participants in the treatment arm, got both intervention components, while Group III and Group IV, the control group, did not.

A structured yoga program that can be done at home includes breathing techniques, yoga poses, and meditation. It takes 30 minutes to complete each yoga session. Om recitation took place first, followed by five minutes of warm-up exercises, four minutes of postures, three minutes of relaxation, eight minutes of breathing, and nine minutes of meditation.

Over the course of five days, the study participants received two hours of yoga instruction. Following instruction, members of the treatment group were asked to carry out the practice once a day for the next ninety days at home. Once every 30 days, they received an invitation to the centres for the routine follow-up. To track their progress and promote accountability, participants were encouraged to use a calendar sheet to note how many days they practise yoga. Each follow-up day included a qualitative evaluation of home-based practice and outcome measurements (BMI and blood pressure).

Lipid Profile parameters namely total cholesterol, triglycerides, very low density lipoproteins, low density lipoproteins, and high density lipoproteins were assessed at the time of beginning and after completion of study were recorded after following all standard precautions at the time of initiation of study and at end of every month till completion of study.

Recruited subjects were recommended to refrain from exercising for at least 24 hours before the assessment and to forgo caffeinated food and beverages on the day of the evaluation. This analysis was conducted in morning after 2h of light breakfast. Subjects were encouraged to void urine before commence of recording.

Participants were also assessed for their quality of life, health and other areas of life by WHO Quality of Life questionnaire (WHOQoL-BREF) [3] at the time of beginning of the study and at every month till completion of study. Regular follow up of study was done by regular phone calls at interval of 15 days.

Results: A total of 300 study participants were enrolled into four groups as described in the methodology based on which it was observed after a 90 day follow up that the study participants in group 1 and group 2, i.e. the intervention group reported a significant improvement in various metabolic and cardiovascular parameters during the course of the study. The study participants from the intervention group reported a significant improvement in their lipid profile parameters, namely triglycerides ($P < 0.05$), low density lipoprotein ($P < 0.05$) and high-density lipoprotein ($P < 0.01$) as summarized in **table 1** and **table 2**.

Table 1: Changes in anthropometric and cardiovascular profile of participants from Group-I and II (intervention groups)

Parameter	G1			G2		
	Baseline	**Day 90**	***P*-value**	**Baseline**	**Day 90**	***P*-value**
Total Cholesterol	202	198	0.764	192	189	0.461
Triglycerides	172	161	<0.05	161	149	<0.05
VLDL	36	34	0.643	32	30	0.578
LDL	124	114	<0.05	114	105	<0.05
HDL	33	35	<0.01	37	40	<0.01

Table 2: Changes in anthropometric and cardiovascular profile of participants from Group-III and IV (control groups)

Parameter	G3			G4		
	Baseline	Day 90	*P*-value	Baseline	Day 90	*P*-value
Total Cholesterol	201	201	0.976	186	186	0.992
Triglycerides	172	171	0.922	159	152	0.158
VLDL	36	35	0.941	33	32	0.957
LDL	124	125	0.975	111	112	0.923
HDL	34	34	0.938	39	39	0.956

The quality of life was assessed based on the WHOQoL-BREF questionnaire and it was observed that the overall quality of life was perceived to be better in the intervention group which was statistically significant (P <0.05).

Discussion:

Effect of Home-Based Yoga Intervention on Lipid Profile in Hypertensive Patients Our study demonstrated significant improvements in the lipid profiles of hypertensive adults in India after a 90-day home-based yoga intervention. Participants in the intervention group showed notable changes in their lipid profile, including reductions in triglycerides ($P < 0.05$) and low-density lipoprotein ($P < 0.05$), along with an increase in high-density lipoprotein levels ($P < 0.01$).

Yoga has been widely recognized for its positive effects on blood pressure reduction, with several studies from both India and internationally supporting its efficacy. For instance, Singh et al. observed a considerable decrease in blood pressure (12 mm Hg reduction in systolic blood pressure (SBP) and 11.2 mm Hg in diastolic blood pressure (DBP)) after a 40-day yoga program for type 2 diabetics.[4] Similarly, Schwickert et al. and Frumkin et al. highlighted yoga as an effective relaxation technique that helps in managing elevated blood pressure and stress.[5,6] Bijlani et al. also found that a short program of lifestyle modifications,[7] including yoga, led to favorable metabolic outcomes within just nine days. Additionally, Aivazyan et al. reported a significant reduction in both SBP and DBP, along with improvements in vascular resistance, emotional stress response, psychological well-being, quality of life, and work capacity.[8]

Numerous studies have affirmed that yoga training leads to an increase in HDL and a decrease in triglycerides (TG) and LDL levels.[9,10]The reduction in DBP and SBP observed in our study is consistent with findings from Murugesan et al., Sahay et al., and Calle Pascual et al.[9-11] Sahay et al. also reported a significant reduction in cholesterol levels after six months of yoga practice, noting decreases in free fatty acids (FFA), LDL, and VLDL cholesterol, alongside an increase in HDL cholesterol. Devasana I et al.[12] also found that after six months of yoga practice, participants experienced significant reductions in heart rate, SBP, and DBP.

Conclusions: A growing body of evidence suggests that home-based yoga interventions can be beneficial for hypertensive patients. Yoga helps reduce blood pressure through stress relief, autonomic regulation, and improved cardiovascular health. However, further randomized

controlled trials are necessary to confirm the effects of standardized yoga programs. Additionally, there is a need for greater recognition of yoga within the healthcare community as a complementary treatment alongside conventional medical care.

References:-

1. Jayasooriya Arachchilage Rajitha Sapun Jayasooriya 2022, 'Therapeutic Effects of Yoga on Hypertension', International Journal of Research and Scientific Innovation, vol. 9, no.12, pp.43.
2. Debbie L. Cohen, Blood Pressure Effects of Yoga, Alone or in Combination with Lifestyle Measures: Results of the Lifestyle Modification and Blood Pressure Study (LIMBS)', The Journal of Clinical Hypertension, ISSN: 1751-7176.s
3. Development of the World Health Organization WHOQOL-BREF quality of life assessment. The WHOQOL Group. Psychol Med. 1998 May;28(3):551-8. doi: 10.1017/s0033291798006667. PMID: 9626712.
4. Singh S, Malhotra V, Singh KP, Madhu SV, Tandon OP. Role of Yoga in modifying certain cardiovascular functions in type 2 diabetic patients. J Assoc Physicians India. 2004;48:461-5.
5. Schwickert M, Langhorst J, Paul A, Michalsen A, Dobos GJ. Stress management in the treatment of arterial hypertension. MMW Fortschr Med. 2006;148:40-2.
6. Frumkin K, Nathan RJ, Prout MF, Cohen MC. Non pharmacologic control of essential hypertension in man: a critical review of the experimental literature. Psychosom Med. 1978;40:294-320.
7. Bijlani RL, Vempati RP, Yadav RK, Ray RB, Gupta V, Sharma R, et al. A brief but comprehensive lifestyle education program based on Yoga reduces risk for cardiovascular disease and diabetes mellitus. J Altern Complement Med. 2005;11:267-74.
8. Aivazyan TA, Zaitsev VP, Salenko BB, Yurenev AP, Patrusheva IF. Efficacy of relaxation techniques in hypertensive patients. Health Psychol. 1988;7:193-200.
9. Mahajan AS, Reddy KS, Sachdeva U. Lipid profile of coronary risk subjects following Yogic lifestyle intervention. Indian Heart J. 1999;51:37-40.
10. Manchanda SC, Narang R, Reddy KS, Sachdeva U, Prabhakaran D, Dharmanand S, et al. Retardation of coronary atherosclerosis with Yoga lifestyle intervention. J Assoc Physicians India. 2000;48:687-94.
11. Murugesan R, Govindarajulu N, Bera TK. Effect of selected Yogic practices on the management of hypertension. Indian J Physiol Pharmacol. 2000;44:207-10.
12. Sahay BK. Yoga and diabetes. Novo Nordisk Diabetes. 1994;1:159-67.
13. Calle Pascual AL, Rodriguez C, Camacho F, Sanchez R, Martin-Alvarez E, Yuste, et al. Behaviour modification in obese subjects with type 2 diabetes mellitus. Diabetes Res Clin Pract. 1992;15:157-62
14. Devasena I, Narhare P. Effect of Yoga on heart rate and blood pressure and its clinical significance. Int J Biol Med Res. 2011;2(3):750-3.