RESEARCH ARTICLE

EFFECT OF RELAXATION TECHNIQUE ON LIPID PROFILE IN CASES OF ESSENTIAL HYPERTENSION

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ABSTRACT

Introduction- Hypertension is known to be associated with derangements in lipid metabolism. Studies have shown that hyperlipidaemia substantially worsens the prognosis in hypertensive patients. *Aim-* To find out the difference in systolic blood pressure, diastolic blood pressure & lipid values at post intervention, in study group and then to compare with control group. *Method-* This was a intervention, randomised, pre and post study. 40 cases having essential hypertension (EH) ,in the age group of 20-60years, including both sexes and taking antihypertensive treatment since 5 to 10 years were recruited for the study. *Result-* Systolic blood pressure post test finding in the study group is significant. Diastolic blood pressure findings at post test is also significant. This finding is significant as shown by one way anova and tukey test. TC, TG, HDL, VLDL values showed a decrease at post test, except LDL. However, a significant decine in HDL level was found. *Conclusion-*The combination of yoga (with asanas and pranayam as mentioned in this study) and guided self imagery can safely be recommended to all patients of essential Hypertension along with routine antihypertensive therapy.

INTRODUCTION

Hypertension or high blood pressure, is a very common and serious condition that can lead to or complicate many health problems. The risk of cardiovascular morbidity and mortality is directly correlated with blood pressure. Risks of stroke, MI, angina, heart failure, kidney failure or early death from a cardiovascular cause are directly correlated with BP (1). Hypertension is known to be associated with alterations in lipid metabolism which gives rise to abnormalities in serum lipid and lipoprotein levels. It has also been documented that presence of hyperlipidaemia substantially worsens the prognosis in hypertensive patients (2). The frequent clustering of hypertension, lipid abnormalities, and other metabolic abnormalities, in an individual has been clearly demonstrated to be synergistic in accelerating atherosclerosis and development of CVD (3). The Framingham Heart Study data on the hypertensive population reported that more than 80% had at least one additional cardiovascular disease (CVD) risk factors such as obesity, glucose intolerance, and dyslipidemia (4).The risk of concomitant hypertension and dyslipidemia is more multiplicative than the sum of the individual risk factors (5). Guided visual Imagery (GVI) has powerful physiological consequences. The body tends to respond to mental imagery exactly as it would to a genuine external experience. Numerous studies have shown that

imagery can affect almost all major physiologic control systems in the body, including respiration, heart rate, blood pressure, metabolic rates in cells, gastrointestinal motility and secretion, cortisol levels, blood lipids, and even immune responsiveness (6). Our hypothesis is that the lifestyle interventions namely yoga and guided visual imagery combined, can have a role to play in slowing down the progress of essential hypertension.

Objectives of the study were-

- To find out the difference in systolic blood pressure, diastolic blood pressure & lipid values at post intervention, in study group.
- To compare study finding with control group.

METHODOLOGY

Hypertension was diagnosed based on the JNC-7 criteria (7). Serum total cholesterol (TC), low-density lipoprotein cholesterol (LDL-C), high density lipoprotein cholesterol (HDL-C), and triglyceride (TG) levels were classified on the basis of the Third Report of the Expert Panel on Detection, Evaluation, and Treatment of High Blood Cholesterol in Adults (ATP III) (8).

Study Design And subjects: This was a intervention, randomised ,pre and post study. 40 Essential Hypertension (EH) patients in the age group of 20-60years, including both sexes and taking antihypertensive treatment since 5 to 10 years were recruited for the study.

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Inclusion criterion was

- Age between 20 to 60 years of both sexes.
- Duration of hypertension between 5-10 years.
- No prior record of following life style modifications.
- Patients with EH consenting to the study.

Exclusion criteria

- Age less than 20 years and more than 60 years.
- Hypertensive patients with major co- morbidities like cardiovascular disease, diabetes mellitus or nephropathy.
- Hypertensive patients having cancer.
- Patients with EH not consenting to the study.

Study setting- Department of Physiology, Jawaharlal Nehru Medical College, Wardha.

Period of Study – 1 ½ years.

Intervention: The study started after obtaining prior approval from Institutional Ethical committee. By random selection 40 patients with essential hypertension was allocated to the intervention/ study group. This study had 2 groups of 20 patients each namely control and study. Patients of both the groups were on their routine antihypertensive medication. The study group of 20 EH patients were subjected to intervention for 3 days with 1 hour duration of work out. The workout was done in 3 steps.

Step 1-One week prior to the intervention all pretest namely systolic blood pressure (SBP) , diastolic blood pressure (DBP) and lipid profile was done.

Step 2- intervention given.

Step 3- 3 months later (after intervention was given), the posttest namely systolic blood pressure, diastolic blood pressure and lipid profile estimation was done.

The schedule of intervention was as follows

- 1st day- orientation to the disease through video programme and lectures.
- 2nd day- performance of asanas & pranayam.
- 3rd day – performance of guided imagery techniques .

The programme started on Tuesday and ended on Thursday of the same week.

Duration of intervention was 3 months

Control group consisted of 20 patients age & sex matched. They were on their routine antihypertensive treatment only. At the outset, basic characteristics including sex, age, , education, marital status, , systolic blood pressure , diastolic blood pressure ,comorbidities (diabetes, dyslipidemia, cardiovascular disease, and stroke), family medical history, and other prescribed medication was documented. The study group perfomed asanas and pranayam. The following asanas were performed- Tadasan, Ardhakatichakraasan, Pawanmukthasan, Shravasan, Bakrasan & Bhujangasan. Pranayam practised was Anulom –Vilom & Bhramri.

The study group practised guided visual imagery on the 3rd day. . Pre packaged DVD & audio compact disc (CD) guided imagery relaxation were used for the relaxation. In this, the patient was first asked to relax in a chair . Then the patient was made to imagine healing rays of yellow light , falling on all the blood vessels in his body, with a soft affirmation that his blood pressure was coming back to normal.

Measurements: Primary outcome of this study was difference in blood pressure between pre & post test in both the groups. Secondary outcome was difference in change in lipid values in both the groups. Mercury sphygmomanometer used was of the diamond make. The standard cuff having a bladder size of 12 cm X 35 cm was used.. The bladder encircled and covered two-thirds of the length of the arm. Proper maintenance and calibration of the sphygmomanometer was done before the tests.. For measurement, the bladder was inflated quickly to a pressure of 20 mm Hg higher than the point of disappearance of the radial pulse. Then the bladder was deflated slowly by 2 mm Hg every second. The first appearance of the sound (Phase I Korotkoff) was the systolic BP. The disappearance of the sound (Phase V Korotkoff) was the diastolic BP. The method of blood pressure recording was followed as per Indian Blood pressure guidelines 2.

In our study normal blood pressure(BP) was defined as less than 140 mm Hg systolic and 90 mm Hg diastolic . BP was recorded in the sitting posture with the sphygmomanometer kept at heart level. An average of 3 consecutive reading with an interval of 30 minutes was taken as the accepted BP level. The fasting blood samples was analyzed for triglycerides (TG), total cholesterol (TC) and high-density lipoprotein–cholesterol (HDL–C). Total cholesterol was estimated by Enzyme end point method. HDL cholesterol was assessed by enzyme direct method. Triglyceride by GPO-PAP method. LDL cholesterol and VLDL were not separately estimated but calculated . LDL was calculated using the formula: LDL cholesterol = Total cholesterol – (HDL cholesterol + TG/5).

Statistical Analysis: Baseline characteristics of subjects and change in namely systolic blood pressure , diastolic blood pressure and lipd values to the conclusion at 12 weeks was analyzed. Statistical analysis was done by using descriptive and inferential statistics using student's paired t test, one way ANOVA and Multiple Comparison Tukey Test . Software used in the analysis was SPSS 24.0 version and $p < 0.05$ was considered as level of significance

RESULTS

Table 1. Age wise distribution of patients in two groups

Age Group(yrs)	Study	Control
31-40 yrs	6(30%)	6(30%)
41-50 yrs	8(40%)	8(40%)
51-60 yrs	6(30%)	6(30%)
Total	20(100%)	20(100%)
Mean±SD	45.75±8.63	45.75±8.63
Range	32-60 yrs	32-60 yrs

Table 2b. Comparison of mean difference in SBP in three groups Descriptive Statistics

Group	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Study	20	150.45	11.78	2.63	144.93	155.96	120.00	167.00
Control	20	156.30	11.09	2.48	151.10	161.49	142.00	172.00

One Way ANOVA

Source of variation	Sum of Squares	df	Mean Square	F	p-value
Between Groups	343.63	2	171.81		
Within Groups	8521.35	57	149.49	1.149	0.324,NS
Total	8864.98	59			

Multiple Comparison: Tukey Test

Group		Mean Difference (I-J)	Std. Error	p-value	95% Confidence Interval	
					Lower Bound	Upper Bound
Study	Control	-5.85	3.86	0.292,NS	-15.15	3.45

Table 3a. Comparison of DBP in two groups at pre and post test

Groups	Pre t/t	Post t/t	Mean Difference	t-value
Study	93.90±6.40	90.25±4.96	3.65±3.71	4.39 p=0.001,S
Control	95.50±5.42	95.50±5.42	0±0	-

DISCUSSION

In our study , at post test both systolic and diastolic blood pressure finding was significant . One way Anova and Tukey test finding was significant for diastolic blood pressure. We found a significant decine in HDL level along with decrease in values of TC, TG., VLDL, except LDL. Dyslipidemia, one of the strong predictors of CVD, causes endothelial damage and loss of physiological vasomotor activity. The damage may manifest as elevated systemic blood pressure (BP) (9). Hypertension, damages the endothelium through altered sheer stress and oxidative stress, resulting in increased endothelial cell synthesis of collagen and fibronectin, reduced nitric oxide-dependent vascular relaxation, and increased permeability to lipoprotein. It is also associated with an upregulation of lipid oxidation enzymes, especially oxidized LDL contributing to atherosclerosis (10,11). Jayaram Gadham,et al studied the effect of Pranayama and certain Yogic Asana's on BP, BMI & lipid profile. This finding is in line with our study.50 male subjects in the age group of 35-55 years were randomly selected based on exclusion criteria. BP, BMI and lipid profile was estimated before any intervention. They were subjected to pranayama and other Asana's for a period of 3 months. After 3 months of Yoga intervention, BP, BMI and lipid profile was estimated. They observed a statistically significant decrease in Systolic BP, Diastolic BP and BMI after 3 months of Yoga training. Also, they observed a decrease in total cholesterol, VLDL, triglycerides and an increase in HDL cholesterol which is not statistically significant (12).

Kumari Rekha et al conducted a study on the "Effect of Hypertension on Lipid Profile of Individuals of Bihar State". 60 patients of hypertension aged 40-50 years attending Outpatient Department of PMCH and 40 healthy volunteers were recruited in the present study to see the effect of hypertension on the lipid profile. Outcome was that the hypertensives showed a highly significant upper range of triglyceride (TG) with P < 0.01. Total cholesterol (TC) and very-low-density lipoprotein (VLDL) showed a partially significant upper range in hypertensives with P < 0.1, whereas high-density lipoprotein (HDL) and LDL showed no variations between these two groups with P > 0.4.

The study concluded that patients with hypertension are more likely to exhibit dyslipidemia, including elevated TC, TG, VLDL, and reduced HDL levels. So, they need a measurement of blood pressure and lipid profile at regular intervals to prevent the risk of CAD and stroke (13). Qigong is a mind – body- medicine technique and is a form of relaxation technique. Myung Suk Lee conducted a study to investigate the effectiveness of Qigong on blood pressure and several blood lipids, such as high-density lipoprotein (HDL) cholesterol, Apolipoprotein A1 (APO-A1), total cholesterol (TC), and triglycerides (TG) in hypertensive patients. Thirty-six patients were randomly divided into either the Qigong group, or a wait-listed control group. Blood pressures decreased significantly after eight weeks of Qigong. The levels of TC, HDL, and APO-A1 were changed significantly in the Qigong group post-treatment compared with before treatment. The results reveal that eight weeks of Qigong reduced blood pressure and changed lipid metabolism to benefit health. The study hypothesized that Qigong has antihypertensive effects and reduces blood pressure via modulation of the lipid levels (14). The effects of stress can be modified by relaxation techniques like yoga, biofeedback training, transcendental meditation, autogenic training, zen, etc. Datey et al(15) demonstrated that shavasan" a yogic exercise which produces complete physical and mental relaxation, significantly lowers blood pressure in hypertensive patients. Patel and Datey(16) have shown a significant reduction in the blood pressure of patients treated with biofeedback training.

Nalin Kumar Mahesh et al reported a study on the the effects of SDK (Sudarshan kriya) on blood lipid levels. The findings of this study bear resemblance to our study. 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.

They found that the 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 and concluded that Yoga therapy has beneficial effect on serum lipid levels and should be included in therapy along with other measures(17). Mahesh NK et al in their study on the role of yoga therapy on lipid profile in patients of hypertension and prehypertension found that 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) .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. The age range of patients was from 25 to 65 years (18). Our results are also in line with study by Nisha et al on diabetic and dyslipidaemic patients, where yoga therapy lead to improvement in lipid profile (19). Also in a study conducted by Jayram et al in obese patient's yoga therapy showed significant effect on lipid profile (20). The exact pathogenetic mechanisms underlying the CVD risk mediated by dyslipidemia are not fully elucidated, but high levels of serum cholesterol are known to increase the risk of developing macrovascular complications such as coronary heart disease (CHD) and stroke (21).

Table 3b. Comparison of mean difference in DBP in three groups Descriptive Statistics

Group	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Study	20	90.25	4.96	1.10	87.92	92.57	78.00	98.00
Control	20	95.50	5.42	1.21	92.96	98.03	80.00	106.00

One Way ANOVA

Source of variation	Sum of Squares	df	Mean Square	F	p-value
Between Groups	277.033	2	138.517		
Within Groups	1653.950	57	29.017	4.77	0.012,S
Total	1930.983	59			

Multiple Comparison: Tukey Test

Group		Mean Difference (I-J)	Std. Error	p-value	95% Confidence Interval	
					Lower Bound	Upper Bound
Study	Control	-5.25	1.70	0.009,S	-9.34	-1.15

Table 4. Comparison of lipid profile in study group, pre and post operatively Student's paired t test

		Mean	N	Std. Deviation	Std. Error Mean	Mean Difference	t-value
TC	Pre t/t	178.05	20	43.44	10.53	0.35±36.70	0.97
	Post t/t	177.70	20	39.49	9.58		p=0.34,NS
TG	Pre t/t	176.11	20	181.97	44.13	2.88±56.69	1.24
	Post t/t	173.23	20	184.04	44.63		p=0.23,NS
HDL	Pre t/t	33.17	20	6.27	1.52	4.35±4.34	2.23
	Post t/t	37.52	20	6.22	1.51		p=0.02,S
LDL	Pre t/t	111.00	20	42.98	10.42	9.64±34.70	1.14
	Post t/t	120.64	20	31.75	7.70		p=0.26,NS
VLDL	Pre t/t	33.17	20	26.27	6.37	2.41±20.18	0.49
	Post t/t	30.76	20	18.75	4.54		p=0.62,NS

Table 5. Comparison of Lipid values in control group pre and post operatively Student's paired t test

		Mean	N	Std. Deviation	Std. Error Mean	Mean Difference	t-value
TC	Pre t/t	197.47	20	61.37	14.88	0.53±11.89	1.57
	Post t/t	198.00	20	58.43	14.17		p=0.13,NS
TG	Pre t/t	186.23	20	76.88	18.64	0.06±37.64	1.43
	Post t/t	173.17	20	76.89	18.65		p=0.17,NS
HDL	Pre t/t	33.82	20	7.02	1.70	1.65±4.55	1.49
	Post t/t	32.17	20	6.73	1.63		p=0.14,NS
LDL	Pre t/t	125.64	20	52.37	12.70	0.77±14.35	3.09
	Post t/t	126.41	20	46.31	11.23		p=0.07,NS
VLDL	Pre t/t	38.00	20	15.11	3.66	1.64±8.37	1.15
	Post t/t	39.64	20	16.59	4.02		p=0.26,NS

It is thus generally recognized and recommended that treatment of hypertension should, in addition to lowering blood pressure, target correction of dyslipidemia (as well as other CVD risk factors) if present, to reduce overall CVD risk and increase the cost-effectiveness of therapy (21,22,23). It has long been known that a low level of HDL cholesterol is a powerful predictor of increased cardiovascular risk (24-27). Eapen et al (28) showed that male and female patients with low HDL-C levels(<35 mg/dL) and with normal total cholesterol levels have more cardiovascular events (such as heart attacks and unstable chest pain) as compared to their adult counterparts with high HDL-C levels. There is strong epidemiological evidence that low HDL-C is an independent risk factor for CVD (24,26) with strong suggestions that interventions to increase HDL-cholesterol will yield clinically significant outcome benefits. The Multiple Risk Factor

Intervention Trial (29) showed that each decrease in HDL-cholesterol of 1 mg/dL (0.03 mmol/L) was associated with an increase in the risk of coronary heart disease of 2% in men and 3% in women. In recognition of its status as a CVD risk factor, ATP III recommends that a low HDL-C (≤40 mg/dL which is equivalent to ≤1.04 mmol/L for both men and women) should be a secondary target of therapy aimed at lipid lowering to reduce CVD risk(24-29, 30-32).

Conclusion

In our study, there was a significant decrease in blood pressure and there was also a significant decine in HDL level along with decrease in values of TC, TG, VLDL, except LDL. Hence the combination of yoga (with asanas and pranayam as mentioned in this study) and guided self imagery can safely be recommended to all patients of essential Hypertension along

with routine antihypertensive therapy. This relaxation technique can assist in the management of dyslipidemia in cases of Essential Hypertension.

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