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Impact of lifestyle intervention strategies on hypertensives

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Abstract
Background: In modern society people prone to stress in all walk of their life. Stress has a direct impact on the heart, as it leads to the release of substances such as catecholamine and cortisol, which leads to hypertension. There is growing evidence to support the use of several complementary and alternative medicine activities to reduce hypertension
Objectives: To evaluate the impact of life style intervention programmes on hypertensive adults in selected areas of Coimbatore district.
Methodology: The impact of lifestyle intervention was conducted in 120 hypertensives including 30 men and 30 women for a period of 120 days**.**
Results: Lifestyle intervention in the present study close down the physical inactiveness reduced mental stress and developed healthy lifestyle and dietary habits among the hypertensives. This in turn helped to decrease weight, waist, and lipid profile and blood pressure in a period of 120 days.
Conclusion: The present study strongly suggested regular healthy lifestyle interventions to overcome the epidemic of hypertension, world's current burden.

Keywords: Hypertension, Yoga and meditation, Laughing therapy, Prehypertension

1. Introduction

Hypertension, also known as high or raised blood pressure, is a global public health issue. It is one of the most common lifestyle diseases today, prevalent in every third person and contributes to the burden of heart disease, stroke, kidney failure, premature mortality and disability. It is reported to be the fourth contributor to premature death in developed countries and the seventh in developing countries [1].

Number of studies demonstrates that individuals with blood pressure >120/80 mmHg, but <140/90 mmHg, termed as prehypertension by WHO, have an increased risk of hypertension, cardiovascular disease and early death from cardiovascular causes. A survey conducted in nine states of India by the National Nutrition Monitoring Bureau (NNMB) reports the pooled estimate of prehypertension is in the range of 40-60 per cent, a precursor condition with high likelihood of converting into hypertension if left unaddressed [2].

There is a misconception among the general public that high blood pressure affects only the old people and youngsters need not have to worry until they reach at least 40 years old. Contrary to this popular belief, statistics have proven high blood pressure does not discriminate based on age, and both young and old are equally affected by this disorder. The sad part is that most people who have this disease are not aware of it because it has practically no symptoms, but the consequences are deadly. Since it has no symptoms, it can remain undetected for many years. If undetected and not treated properly, it can lead to death, and is therefore referred to as a silent killer [3].

In modern society people prone to stress in all walk of their life. Stress has a direct impact on the heart, as it leads to the release of substances such as catecholamine and cortisol, which are not good for the functioning of heart [4].

There is growing evidence to support the use of several complementary and alternative medicine activities to improve BP. These lifestyle intervention programmes include yoga, certain relaxation techniques and meditation. Various studies states that yoga can be preliminarily recommended as an effective intervention for reducing blood pressure [5]. Non-drug therapy of hypertension is needed more than ever now but its research evidence remains much low. Hence, the study was undertaken with the objective to evaluate the impact of life style intervention programmes on hypertensive adults in selected areas of Coimbatore district.

2. Methodology

For the study, health camps were conducted with the support of medical personnels at selected areas of Coimbatore district, Tamil Nadu and 60 hypertensive men and 60 hypertensive women were selected through proper screening by medical experts. Selected 60 hypertensives including 30 men and 30 women were grouped as experimental group LM and group LW respectively and 60 hypertensives including 30 men and 30 women were grouped as control group CM and group CW. The hypertensive men and women were selected based on the following inclusion criteria.

Inclusion criteria

- **Blood pressure:** SBP 120-129 mmHg/DBP80-89 mmHg (Prehypertensives)
- **Age:** 25 - 45 yrs
- **Sex:** Male and Female
- **Duration of the disease:** < 5 yrs
- Not taking antihypertensive medication
- Free of complications

- Willingness to participate in feeding trials

Many studies revealed that physical inactivity, stress and dietary pattern were main risk factors for hypertension. Hence for the study, the lifestyle intervention was planned systematically by including yoga asanas, meditation, breathing exercises, laughing therapy and nutrition education intended to increase the physical exercise, reduce the stress and improve the dietary pattern of hypertensives. Before beginning the intervention, the selected hypertensives were oriented on the importance of lifestyle modification strategies, its health benefits and the consequent analysis parameters. Written consent was obtained from the experimental and control groups. Training on lifestyle intervention strategies were given to the experimental groups by a professional trainer from reputed institute.

The training was given on simple yoga asanas in sitting, standing, kneeling, prone and supine positions, breathing exercise (pranayama) and meditation. They also instructed to simulate laughter for 45 seconds to one minute, beyond the typical burst of laughter, which was followed by deep breathing and gentle stretching. The training was given for a period of 4 days, 2hrs/day. After the training period, they were instructed to practice the same for 45 minutes/day for at least 6 days in a week, for a period of 120 days. This was thoroughly monitored by the investigator and trainer regularly.

Nutrition education was given to the experimental groups by using specially prepared booklet, pamphlet and presentation of slides, group discussions and personal counselling on the causes, complication of hypertension, importance of healthy eating habit, significance of physical exercise and other associated factors which favored blood pressure reduction.

The experimental groups were instructed to record their daily food intake, day and duration of yoga practiced and it was well monitored by the investigator along with the yoga expert.

The control groups did not receive any training or nutrition education. Regular blood pressure measured was recorded for the experimental groups and control groups weekly once by the investigator. The impact of lifestyle intervention was assessed through blood pressure, anthropometric measurements and bio-chemical parameters.

2.1 Statistical analysis

The data were systematically consolidated, tabulated and analysed using statistical package for the social sciences, version 17. All data were expressed as Mean±SD, Student's t-test was performed for experimental and control groups. Correlation analysis was done for different parameters.

3. Results and Discussions

The impact of lifestyle intervention on hypertensive adults was analysed and the results were given below.

3.1 Impact on Anthropometric measurements

3.1.1 Weight

The impact of lifestyle intervention on weight is illustrated in Figure –1.

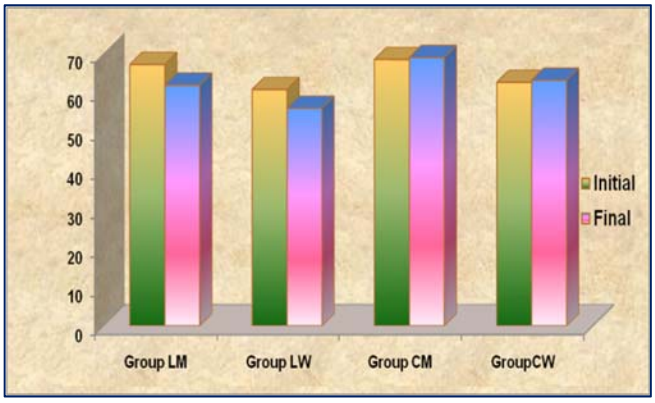

Fig 1: Impact of lifestyle intervention on weight

From the figure it is cleared that initially both experimental and control groups were found to have weight more than their reference value. At the end of lifestyle intervention period, it was good to note that the experimental groups who were under lifestyle intervention showed a significant decrease in weight whereas it was not seen in control groups who were not followed any lifestyle modification strategies. The weight reduction in the experimental groups was found to be 5.27 kg in group LM and 4.80 kg in group LW. In converse with the experimental groups, the control groups recorded an increment of 0.52 kg and 0.54 kg in group CM and group CW.

3.1.2 Prevalence of overall obesity

Table 1: states the impact of lifestyle intervention on prevalence of overall obesity.

Table 1: Impact of lifestyle intervention on overall prevalence of obesity (in percent)

Body Mass Index (BMI)	Experimental groups (N=60)				Control groups (N=60)			
	Group LM (n=30)		Group LW (n=30)		Group CM (n=30)		Group CW (n=30)	
	Initial	Final	Initial	Final	Initial	Final	Initial	Final
Normal (18.5 to 22.9)	23	56	Nil	Nil	7	Nil	10	10
At risk of obesity (23 to 24.9)	27	7	23	80	33	40	67	70
Obesity stage –I (25 to 29.9)	27	30	64	17	37	37	13	10
Obesity stage –II (>30)	23	7	13	3	23	23	10	10

At the beginning of the study, Obesity stage-I was more prevalent among all the groups except group CM. At the end of lifestyle intervention, it was pleasant to note that the obesity was found to reduce in the experimental groups where as it was not seen in control groups. In group LM, prehypertensives with normal BMI was increased to 56 per cent and obesity stage –II and at risk of obesity was reduced to seven per cent. It might be due to the migration of obesity II and at risk of obesity towards their subsequent lower risk groups at the end. Even in group LW, obesity stage-I was reduced from 64 per cent to 17 at the end of intervention whereas in control group not much changes was noticed with respect to overall obesity.

3.2 Blood Pressure

Impact of lifestyle intervention on blood pressure is depicted in Table -2.

Table 2: Impact of lifestyle intervention on blood pressure level

Experiment groups (EX)					Control groups (CT)					
Blood pressure (mm Hg)	Mean (mm Hg) + SD			t-value	Blood pressure (mm Hg)	Mean (mm Hg) + SD			t-value	EX vs CT (t-value
	Initial	Final	Mean Diff.			Initial	Final	Mean Diff.		
	LM (n=30)					CM (n=30)				
SBP	130.63±4.02	122.33±3.67	-8.3 ±1.29	35.23**	SBP	134.50±3.68	135.03±3.71	0.57±1.91	1.62^{NS}	21.10**
DBP	83.5±2.71	79.03±2.28	-4.47 ±1.25	19.54**	DBP	83.97±2.26	84.27±2.42	0.30±1.24	1.33^{NS}	14.84**
LW (n=30)					CW (n=30)					
SBP	129.50±5.16	120.90±4.67	-8.60 ±1.38	34.14**	SBP	131.87±5.22	132.57±5.32	0.70±2.72	1.41^{NS}	16.71**
DBP	83.50±3.62	79.37±3.76	4.13 ±1.31	17.33**	DBP	82.67±3.30	83.07±3.64	0.40±1.38	1.59^{NS}	13.07**

***Significant at (p≤0.01) level NS –Not Significant EX- Experimental CT- Control*

At the initial stage, the highest SBP/DBP was recorded by the control group CM compare to other groups. At the end of lifestyle interventions, the experimental group LM showed a decrease in SBP from 130.63 mm Hg to 122.33 mm Hg and reduction in DBP from 83.5 mm Hg to 79.03 mm Hg.

In group LW, the depletion was from 129.5 mm Hg to 120.90 mm Hg in SBP and from 83.50 mm Hg to 79.37 in DBP. The decrease was found to be more in group LW (8.60 mm Hg) when compare to group LM (8.3 mm Hg). But with respect to DBP, group LM showed greater decrease (4.47 mm Hg) in comparison with group LW (4.13 mm Hg).

In control groups, elevation of were noticed in SBP level and DBP levels. The changes were found to be not significant in control groups whereas the changes in the experimental groups was noticed to be statistically significant.

In a prospective cohort study involving subjects with and without established coronary artery disease subjected to a course in yoga and meditation showed significant reductions in blood pressure, heart rate and body mass index (BMI). Interventional studies showed beneficial effects of pranayama and meditation practice for 15 days and 12 weeks in reducing systolic blood pressure, diastolic blood pressure irrespective of age, gender and BMI in normal individuals [6].

On par with the above statements, the favorable reduction in the experimental groups might be due to the cumulative effect of life style intervention strategies. Regular practice of yoga exercises, asanas, meditation and laughing therapy along with nutrition education might have brought changes in their physical and mental health thereby it resulted in blood pressure reduction. The stress and stress induced disorders like hypertension and angina are fast growing epidemics and bane of modern society. The holistic science of yoga is the best method for prevention as well as management of stress and stress induced disorders like hypertension. It was also highlighted in the present study and can be concluded that lifestyle intervention had potential effect on blood pressure reduction and its associated risk factors. Hence, it could be adopted as one of the best non- pharmocological strategy to treat blood pressure irrespective of the age and sex.

3.3. Bio-chemical parameters

3.3.1 Lipid Profile

Impact of lifestyle modification on serum lipid profile is described in Table –3.

Many researches showed that hypertension and hypercholesterolemia aggravate the cardiovascular disease in individuals. Observation of the table reveals that the total cholesterol level of both the experimental and control group was noted within the reference value. Among the groups, group LM recorded the highest value (175.25 mg/dl) for total cholesterol, followed by group LW (166.39mg/dl), group CM (162.73 mg/dl) and group CW (156.33 mg/dl).

After the intervention period, the experimental groups recorded a reduction in the serum total cholesterol level whereas the control groups showed an increase. The experimental groups showed reduction by 17.08 mg/dl by group LM and 18.65 mg/dl by group LW. The fall was higher in group LW in comparison with group LM and both groups changes were found to be statistically significant.

The control groups showed an increase of 0.82 mg/dl and 0.99 mg/dl in group CM and group CW respectively. It was not statistically significant. When compared to control groups, the experimental groups outcome favored the health and showed the effectiveness of lifestyle modification strategies adopted by the experimental groups. The decrease in lipid profile seen in this present study was in agreement with the earlier studies results which showed a significant reduction in free fatty acids, LDL and an increase in HDL due to regular yoga practice [7,8].

Table 3: Impact of lifestyle intervention on serum lipid profile

Serum lipid profile Desirable level(mg/dl)	Experimental groups						Control groups						EX Vs CT (t-value)	
	Group LM (n=30)			Group LW (n=30)			Group CM (n=30)			Group CW (n=30)				
	Mean (mg/dl) ± SD						Mean (mg/dl) ± SD						LIM vs CTM	LIW vs CTW
	Initial	Final	t-value	Initial	Final	t-value	Initial	Final	t-value	Initial	Final	t-value		
Total Cholesterol <200	175.25 ±14.10	158.17 ±13.98	49.18**	166.39 ±5.79	147.74 ±5.65	28.47**	162.73 ±16.67	163.55 ±17.02	1.39^{NS}	156.33 ±12.87	157.32 ±13.57	0.42^{NS}	1.24^{NS}	5.26**
LDL<130	96.44 ±15.14	77.80 ±14.50	48.27**	86.96 ±6.53	67.02 ±5.50	30.02**	87.83 ±17.86	88.97 ±18.45	1.50^{NS}	77.62 ±9.68	77.35 ±9.32	0.39^{NS}	2.54**	6.94**
HDL >50	46.71 ±5.12	51.30 ±4.96	24.86**	49.22 ±3.25	54.58 ±2.68	25.47**	44.39 ±5.84	43.92 ±6.06	1.48^{NS}	47.91 ±5.63	47.84 ±5.69	0.24^{NS}	5.16**	9.55**
Triglyceride<150	160.5 ±25.18	145.36 ±25.00	39.35**	151.06 ±7.36	130.66 ±6.29	33.41**	152.50 ±14.19	153.30 ±15.34	1.20^{NS}	156.33 ±12.87	157.32 ±13.57	1.89^{NS}	1.48^{NS}	9.77**
VLDL<30	32.1 ±5.04	29.07 ±5.00	39.35**	30.21 ±1.47	26.13 ±1.26	33.41**	30.50 ±2.84	30.66 ±3.07	1.20^{NS}	31.27 ±2.57	31.46 ±2.71	1.89^{NS}	1.48^{NS}	9.77**

Desirable Level (NCEP, 2012) ***Significant at (p≤0.01) level NS – Not Significant EX- Experimental CT- Control*

The triglyceride levels of group LM and group LW was observed as 160.5 mg/dl and 151.06 mg/dl respectively and the corresponding values of control group CM and CW was seen as 152.50 mg/dl_and 156.33 mg/dl. Among all the groups, group LM showed the highest triglyceride level.

On completion of life style modification strategies, experimental groups showed a significant reduction in triglycerides levels. Triglyceride levels depleted to 145.36 mg/dl in group LM and decreased to 130.66 mg/dl in group LIW. The fall in the triglyceride level was more in group LW (20.4 mg/dl) when compared to group LM (15.14 mg/dl) at the end.

The control group CM and group CW recorded 153.30 mg/dl by increasing 0.80 mg/dl and 157.32 mg/dl by elevating 0.99 mg/dl on completion of lifestyle intervention.

When compared to control groups, the experimental groups showed a significant decrease in the triglyceride levels. It might be due to the cumulative effect of lifestyle intervention strategies and nutrition education.

HDL level in all the groups was found to be lower than the reference value initially. On completion of intervention trial, the HDL level in group LM increased from 46.71 mg/dl to 51.30 mg/dl and in group LW, it was elevated from 49.22 mg/dl to 54.58 mg/dl where as in control group CM and group CW, negligible depletion of HDL level was noted. The change in the experimental group was statistically significant but it was not significant in control groups. Among the experimental groups, group LW showed more increment in comparison with group LM.

With respect to VLDL level, significant decrease was noticed in both the experimental groups and it was found to be 3.03 mg/dl and 4.08 mg/dl_in group LM and group LW respectively. The LDL level also decreased from 96.44 mg/dl to 77.80 mg/dl in group LM and depleted from 86.96 mg/dl to 67.02 mg/dl in group LW.

The experimental groups showed significant reduction in VLDL and LDL levels where as the control group showed non-significant increment at the end. It can be concluded that the experimental groups who received lifestyle modification strategies showed a decrease in VLDL, LDL and increase in HDL level whereas the control groups who were not receiving the intervention strategies didn't show any favourable results.

3.4. Correlation analysis

Table -4 depicts the correlation analysis between Systolic Blood Pressure (SBP) /Diastolic Blood Pressure (DBP) and other parameters.

Table 4: Correlation between SBP and DBP and other parameters

Parameters	Correlation co-efficient			
	Lifestyle Intervention			
	LM		LW	
	SBP	DBP	SBP	DBP
Body weight	+0.361	+0.277	+0.197	+0.061
Body Mass Index	+0.399	+0.208	+0.042	+0.011
Weight Height Ratio	+0.191	+0.044	+0.010	+0.042
Total cholesterol	+0.013	+0.162	+0.070	+0.034
Triglyceride	0.062	+0.149	+0.092	+0.055
HDL	-0.033	-0.120	-0.167	-0.017
LDL	+0.022	+0.062	+0.012	+0.084
VLDL	+0.062	+0.149	+0.092	+0.055

From the above table it was clear that Systolic Blood Pressure (SBP) and Diastolic Blood Pressure (DBP) of the experimental groups LM and LW were positively correlated with body weight, body mass index, waist height ratio, total cholesterol, triglyceride, and LDL and VLDL levels. It was negatively correlated with HDL level.

4. Conclusion

Lifestyle intervention in the present study close down the physical inactiveness reduced mental stress and developed healthy lifestyle and dietary habits among the hypertensives. This in turn helped to decrease weight, waist, and lipid profile and blood pressure in a period of 120 days.

The treatment of hypertension is no longer limited to the simple prescription of pharmaceuticals. For many patients, maximal medical therapy was insufficient to adequately treat refractory hypertension. Despite the abundance of pharmaceutical options for the treatment of hypertension, lifestyle modification remained an important approach in management of hypertension. The present study strongly suggested regular healthy lifestyle practices to overcome the epidemic of non-communicable lifestyle diseases, world's current burden.

References

1. WHO, 2013. http://www.searo.who.int/entity/.
2. Ray S, Kulkarni B, Sreenivas A. Prevalence of prehypertension in young military adults& its association with overweight & dyslipidaemia, Indian journal of medical research. 2011; 134(2):162-167.
3. Nadkarni A, Murthy P, Crome IB, Rao R. Alcohol use and alcohol-use disorders among older adults in India: a literature review. Aging Ment Health, 2013; 17(8):979-991. doi: 10.1080/13607863.2013.793653.
4. Kataki R. Stress the lifestyle killer, 2015. Retrieved from www.newindianexpress.com.
5. Hagins M, States R, Selfe T, Innes K. Effectiveness of Yoga for Hypertension: Systematic Review and Meta-Analysis. Evidence-Based Complementary and Alternative Medicine, 2013. doi.org/10.1155/2013/649836.
6. Ankad R, Herur A, Patil S, Shashikala GV, Chinagudi S. Effect of short term pranayama and meditation on cardiovascular functions in healthy individuals. Heart views, 2011; 12(2):058-62. doi: 10.4103/1995-705X.86016.
7. Vaishali K, Kumar KV, Adhikari P, Unnikrishnan B. Effects of Yoga-Based Program on Glycosylated Hemoglobin Level Serum Lipid Profile in Community Dwelling Elderly Subjects with Chronic Type 2 Diabetes Mellitus–A Randomized Controlled Trial. Physical & Occupational Therapy in Geriatrics, 2012; 30(1):22-30.
8. Singh A, Kyizom T, Singh KP, Tandon OP, Madhu SV. Influence of pranayamas and yoga asanas on serum insulin, blood glucose and lipid profile in type 2 diabetes. Indian journal of clinical biochemistry. 2008; 23(4):365-368.