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Study to evaluate the role of yoga therapy in decreasing blood pressure among hypertensive subjects

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Abstract:

Introduction: Hypertension is one among the leading contributors to the burden of non communicable diseases globally. According to JNC-8, the definition of hypertension is Systolic Blood Pressure (SBP) as 140 mmHg or higher or Diastolic Blood Pressure (DBP) as 90 mmHg or higher or both. Whereas derived from the Sanskrit word "YUJ", means to attach, to join or to unite. Yoga is a beneficial multifunctional therapeutic modality in the treatment of a variety of psychological and medical conditions such as depression, anxiety, post-traumatic stress disorder, hypertension, cardiovascular diseases, bronchial asthma, COPD, Diabetes Mellitus, hypercholesterolemia.

Material and Method: On the basis of physician diagnosis, twenty-five (N=25) hypertensive patients, aged 36-65 years were examined with 4 variables viz systolic and diastolic blood pressure, heart rate and body weight. The subjects were randomly assigned to experimental and control groups. The patients belonging to the experimental group underwent the yoga session consisting of a selected series of yoga along with their antihypertensive drug therapy and the control group did not participate in yoga sessions but continued the prescribed antihypertensive drugs.

Results: Yoga sessions were imparted in the morning with 30 min/session for a total period of 30 days. The result shows that while comparing the pre-test and post-test level of blood pressure in the experimental and control group the mean ± SD of systolic pressure in experimental group was 134.16 ±6.89 and in control group it was as 150.47 ±9.97, with p test value of <0.05 (systolic) and <0.05 (diastolic), which was statistically significant.

Conclusion: A short yoga program for the patient to practice at home seems to have an antihypertensive effect, as well as a positive effect on self-rated quality of life compared to controls. This implies that simple yoga exercises may be useful as a supplementary blood pressure therapy in addition to medical treatment when prescribed by primary care physicians.

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Keywords: Blood Pressure, Systolic Pressure, Diastolic Pressure, Yoga therapy.

Introduction

Nowadays, High blood pressure is one of the leading contributors to the burden of disease globally. [1] Total 62% of Cardiovascular diseases and 49% of Ischemic heart disease are caused due to uncontrolled Hypertension. [2] Cardiovascular diseases prevalence is high in Indians, among these an important modifiable risk factor is hypertension. [3] According to JNC-8, the definition of hypertension is SBP as 140 mmHg or higher or DBP as 90 mmHg or higher or both. Whereas derived from the Sanskrit word "YUJ", means to attach, to join or to unite. [4]

Yoga is a beneficial multifunctional therapeutic modality in the treatment of a variety of psychological and medical conditions such as depression, anxiety, post-traumatic stress disorder, hypertension, cardiovascular diseases, bronchial asthma, COPD, Diabetes Mellitus, hypercholesterolemia etc. [5] In a research study, it states that yoga modulates the physiological system of the body, and effects specifically on the heart rate. This review is significant because yoga presents an effective method of treating hypertension that is non-pharmacologic and therefore there are no adverse effects and there are other valuable health benefits [6].

Stress is one of the predisposing factors for hypertension. Hypertension is a leading risk factor for mortality and ranked 3rd as a cause of disability adjusted life years. Yoga reduces the cortisol levels thereby stress is reduced. Yoga promotes the flexibility of the arteries and reduces the rigidity of the arteries and also promotes the free flow of blood in the arteries thus resulting in control of hypertension. [7] Meditation and relaxation techniques offers a reduction in the diastolic and systolic blood pressures during the mental stress [8]. Several clinical trials investigated the efficacy of non-pharmacological interventions and lifestyle modifications to reduce blood pressure [9]. Yoga has received a considerable amount of study to date demonstrating significant cardio-respiratory benefits [10].

Yoga therapy may prove to be beneficial in hypertensive population. As per one study, yoga therapy and meditation are successful in reducing the systolic and diastolic blood pressures [11]. Yoga therapy has been proven to be more effective in comparison to meditation alone. Our review has focused on both hypertensive population and has not isolated prehypertension as the primary health condition. Supporting literature also has been found on both hypertension and pre-hypertensive population [12]. Yoga therapy is proven to be beneficial in reducing the cardio-vascular risks as per study, all the predisposing comorbidities for developing cardiovascular disease and not solely elevated blood pressures. [13]

The aim is to investigate the effectiveness of yoga on the blood pressure in hypertensive patients.

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Material and Methods

This is a prospective, observational, quasi-experimental study, pre-test post-test control group design with multiple observation study was conducted at a Tertiary health centre at Datia.

Total 50 identified cases of hypertensive subjects were selected by using simple random sampling techniques. Confidentiality was assured to the entire subjects to get their co-operation. The subjects were divided into experimental and control groups, first data were collected for the control group after which they study was carried out for the experimental group A pre-tested, structured and close ended questions were administered in the local language.

Inclusion criteria: Either gender above the age of 35 years patients suffering from hypertension included in this study.

Exclusion criteria: Patients suffering from other disorders like liver disease, pulmonary diseases, malabsorption, orthopaedic problems (that contraindicate yoga and exercise) thyrotoxicosis, alcoholism and non-co-operative patients were excluded from the study.

Initially they were interviewed about their demographical data and information related to disease condition, dietary pattern and habit of exercise. Afterwards blood pressure level was measured by using a sphygmomanometer followed by the series of selected yoga therapy. Yoga was demonstrated only to the experimental group for 30 to 40 minute/day and they were asked to come to PHC daily for 30 days where under the instruction and supervision the subjects were invited to perform yoga therapy daily between 10 am to 11 am and it was observed. Blood pressure was checked on the 15^{th} day and 30^{th} day for both the groups by using sphygmomanometer.

The techniques of yoga therapy are basic warming up practices:

Stand on one leg and shake the other leg. Repeat on the other side and then alternative a few times between right and left. Stand on both legs and start to shake your hands one at a time. Alternate between the right and leg a few times and then start to shake both hands at the same time.

Shake your hands and move them up, down, to the left and to the right. Shake your hands all around you in a circular movement. This help to energize the pranayama kosha, our energy sheath or subtle body. Come back to the standing position. Open the legs two feet apart and keep the hands on the hip. Move the torso in all four directions clock wise and antilock wise in a grinding action. Then do it in a continuous manner. Bend forward and perform some toe touching with a bouncing action. Bounce to the front, and then move to your left. Move to your right and then come back to the front. Come back to the standing position.

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Spread your feet a bit and lift both arms to the side. Start to twist your torso from side to side a few times. Feel the stretch in your hip region and back. Come back to the standing position and relax with deep breathing for some time.

Sit down with both legs stretched out in front of you. Draw your right knee up to your chest and then kick out with a whooshing sound. Perform the same action on the left side. Continue to alternate legs for some time. Draw up both your knees and do the same action with a whooshing sound as you release the feet. Relax with your feet stretched out in front.

Statistical analysis

Data were entered, statistical analysis were done using computerized software using inferential and descriptive statistics.

Result

50 subjects were examined, among them majority of sample 13 out of 25 (52%) in the experimental group and 13 out of 25 (52%) in control group were between the age group of 46-55 yrs. Regarding gender, the majority of sample 15 out of 25 (60%) in experimental group and 13 out of 25 (52%) in control group were males. With respect to educational status, majority of sample 18 out of 25 (72%) in experimental group and 19 out of 25 (76%) in control group were no education. On occupation, most of the samples 8 out of 25 (32%) in experimental and 7 out of 25 (28%) were unemployed. And regarding religion, the majority of the sample 23 out of 25 (92%) in experimental group and 21 out of 25 (84%) were comes under Hindus. In the reply to the questions related to the basis of disease condition includes duration if illness, history of Hospitalization, duration of taking treatment etc. stage 1 hypertension (140-159mm Hg,) stage 2 (>160 mm Hg). Based on this category BP was measured before and after the intervention. While assessing the pretest level of systolic pressure among study group it was identified 15 (60%) were falling under the category of Stage 1 Hypertension, but in posttest it was found 25 (100%), the tremendous transformation into pre-hypertension.

Table 1. Distribution of sample a according to patients profile

			N=50
Demographic Variables	Experimental Group (n=25)		Control Group (n=25)	
	No.	%	No.	%
Age				
36 - 45 years	4	16.0	4	16.0
46 - 55 years	13	52.0	13	52.0
56 - 65 years	8	32.0	8	32.0
Sex				
Male	15	60.0	13	52.0
Female	10	40.0	12	48.0

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Educational Status					
No education		18	72.0	19	76.0
Higher secondary		2	8.0	4	16.0
Graduate		5	20.0	2	8.0
Post graduate		0	0.00	0	0.00
Occupation					
Employed	Heavy worker	4	16.0	3	12.0
	Moderate worker	6	24.0	7	28.0
	Sedentary worker	7	28.0	8	32.0
Unemploye		8	32.0	7	28.0
Religion					
Hindu		23	92.0	21	84.0
Christian		2	8.0	2	8.0
Muslim		0	0.00	2	8.0
Others		0	0.00	0	0.00

Table 2. Distribution of samples on the basis of disease condition

				No=50
Demographic Variables	Experimental Group (n=25)		Control Group (n=25)	
Duration of Illness	No.	%	No.	%
1 - 3 years	14	56.0	8	32.0
4 - 6 years	08	32.0	11	44.0
Above 7 years	3	12.0	6	24.0
History of hospitalization				
for hypertension?				
Yes	9	36.0	11	44.0
No	16	64.0	14	56.0
How long are you taking				
treatment?				
1 - 5 years	19	76.0	13	52.0
Above 5 years	6	24.0	12	48.0
Are you taking treatment				
regularly?				
Yes	21	84.0	20	80.0
No	4	16.0	5	20.0

Above Table 2 Shows the Distribution of samples on the basis of disease condition, most of the samples 8 (32.0%) in experimental group and 11 (44.0%) in control group had hypertension for the duration between 4-6 yrs. Regarding history of hospitalization for hypertensive patients, 16 (64.0%) and 14 (56.0%) in experimental and control group had no history of hospitalization respectively. Regarding patients under regularity of treatment, most

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of the sample in experimental group 21 (84) % and in control group 20 (80%) were taking medication regularly. In order to have a clarity in measuring BP level it had been categorized into Normal, pre hypertension(120-139 mm Hg), When considering the diastolic measurement 14 (56%) were falling under stage 2 hypertension in pre-test where as in post-test almost 42% were observed of having pre and stage 1 hypertension.

Table 3 Comparison of pretest and posttest level of systolic blood pressure in the experimental group

			N=25
Experimental group	Mean	SD	'p' value
Systolic			
Pretest	167.84	13.41	<0.05*
Post test	145.95	5.87	(S)

Table 4. Comparison of pretest and posttest level of diastolic blood pressure in the experimental group

Experimental group	Mean	SD	'p' value
Diastolic			
Pretest	115.49	21.86	<0.05*
Post test	96.17	10.22	(S)

The above table 3 & 4 depicts that the mean pretest systolic pressure levels is 167.84 ±13.41 and mean posttest is 145.95 ±5.87. with the obtained p value of <0.05, and the mean posttest diastolic blood pressure is 115.49 ±21.86 and mean score of posttest is 96.17 ± 10.22. With 'p' value of diastolic blood pressure <0.05 is statistically significant which shows that there is a reduction of blood pressure due to practice of Yoga therapy.

Table 5. Comparison of posttest level of blood pressure between the experimental and control group

Groups	Mean	SD	p value
Systolic			
Experimental group	134.16	6.89	<0.05*
Control group	150.47	9.97	(S)
Diastolic			
Experimental group	96.17	10.22	<0.05*
Control group	112.49	7.36	(S)

Table 5 summaries that the mean systolic pressure in experimental group is 134.16 ±6.89 and the mean systolic pressure in control group is 150.47 ±9.97, thus the mean systolic pressure value of experimental group is lower than the mean value of control group.

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Table 6. Comparison of pretest and posttest level of Heart rate &BMI in the experimental group

Variable		Mean	S.D	'p' Value
Heart	Pretest	80.05	3.78	<0.05*
Rate	Post Test	75.09	1.87	(S)
BMI	Pretest	33.60	3.82	<0.05*
	Post Test	31.97	3.38	(S)

Table 6 represent the influence yoga therapy on heart rate and BMI among experimental group. The mean± SD pretest level of heart rate was 80.05 ±3.78, and posttest level of heart rate was 75.09 ±1.87. With the obtained 'p' value of <0.05 was statistically significant. So, yoga therapy has good effect on heart rate. With regard to BMI score the mean± SD pretest BMI 33.60±3.82, and posttest BMI score on posttest was 31.97± 3.38. With the obtained 'p' value of <0.05 was statistically significant. So, the yoga has good effect on reducing obese.

Discussion

The present study was conducted to determine the effects of yoga on BP and quality of life in patients in primary health care. Our results demonstrated a significant reduction in DBP in the patients who practiced yoga at home compared to the control group ($p < 0.05$). The yoga at home group also showed a greater improvement in quality of life than the control group ($p < 0.05$). Patients who practiced yoga in a group with an instructor, however, did not experience significant improvements in BP or self-rated quality of life compared to the control group. Only three of the 83 participants failed to attend the follow-up appointment. This means that a sufficient number of patients completed the study according to the power calculation.

The results imply that simple yoga exercises may be useful as a supplementary BP therapy in addition to medical treatment when prescribed by primary care physicians. It is well known that physical activity has a BP lowering effect. For those patients who are not able or willing to do demanding exercise, an easy yoga program could be an alternative.

It is interesting to note that a relatively small effort for the health care center (in terms of number of visits) had the best effect on BP and quality of life.

The present study contributes to yoga-hypertension research by examining the effects of yoga in a primary health care setting, where most patients with hypertension are treated. The shorter intervention (yoga at home) can easily be taught to the patient by his or her own doctor at the health care center.

Previous studies have shown that yoga reduces BP [10]. However, the yoga intervention design varied among these studies and the length of the intervention ranged from 3 to 20 weeks, making it difficult to compare the interventions in terms of effectiveness.

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Furthermore, some of the studies combined the yoga treatment with other measures, such as changes in diet [11].

One of four invited patients (25%) chose to participate in the study. These patients were probably open-minded about complementary and alternative therapy. In view of this selection bias, the results of the study are probably not applicable to all patients in primary care with hyper-tension. However, this is the case in most other comparable yoga studies. As reported, the yoga at home patients rated their quality of life at baseline higher than the other groups. This fact could indicate a higher motivation among these patients to try something new to further improve their quality of life. On the other hand, one could argue that it is more difficult to improve quality of life when starting from a higher level. Additionally, the fact that the yoga at home group had an early private appointment with a study physician may in itself have had a positive effect on the results [12]. Patients probably adhere more to a doctor's advice about yoga when yoga is used as a supplementary therapy. However, the patients in the yoga at home group only met the doctor for 20 minutes, while the yoga class group patients met their instructor for 12 hours during the intervention period.

It is unclear why the yoga class group did not have any reduction in BP. One possible explanation lies in the yoga exercises the two groups performed at home. The yoga class group had a more advanced yoga program than the yoga at home group. This may have contributed to the fact that the yoga class group participants performed fewer yoga sessions at home during the intervention than the yoga at home participants. The number of sessions may have influenced the result, but the yoga class group patients spent on average about 50% more time doing yoga than the yoga at home group patients. There might have been additional barriers to the yoga class group members than the advanced exercises, such as travelling to the health care center each week. Being in a class environment with other patients could also make some people feel insecure and uncomfortable. However, one could also argue that these barriers would be balanced by a rewarding inter-action with the instructor and other group members.

According to a Swedish literature review, the mean reduction of BP from an antihypertensive drug is 10/ 5 mmHg, when used alone [13]. The effect of an additional drug is mostly lower. In view of this fact, the mean reduction of DBP of 4.4 mmHg, shows that the effect of the short yoga program could be of clinical relevance and interest when used as a supplement to other treatment.

A weakness of the study concerns the self-reported data (yoga calendar), which is a problem in all studies of this kind. In general, studies on supplementary intervention are difficult to perform, but none the less it is an important study since yoga is increasingly popular and practiced by many people.

The fact that the proportion of women in the different groups varied, with the highest proportion of women in the yoga at home group, may have influenced the results to some

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extent, since women tended to have a greater SBP-lowering response to yoga than men. However, the differences in age and gender between the groups were not significant.

The participants were matched for SBP at study start. They were not matched regarding the number of medicines. The yoga class group patients had on average more antihypertensive drugs than the yoga at home and control group patients. The differences between the groups were not significant, but more medicines could indicate more severe hypertension.
A 24-hour ambulatory BP measurement would be a more accurate method to measure BP over time, but this was not possible in our study. Moreover, even studies on the effects of medicine on BP are usually not made with 24-hour ambulatory BP measurement.

Randomized allocation is superior to matching in most studies, and this is a limitation of the study. Our ration-ale for matching the groups was that we wanted to ensure similar SBP values at baseline.

Conclusion

A short yoga program for patients to practise at home seems to have an antihypertensive effect, as well as a positive effect on self-rated quality of life. This implies that simple yoga exercises may be useful as a supplementary BP therapy in addition to medical treatment when prescribed by primary care physicians. One could also speculate as to whether this in the long run could influence medicine intake, side effects and drug costs. However, larger, randomised controlled studies are needed to confirm the antihypertensive effect of yoga and to identify the groups of patients that will benefit most from yoga-based treatment. We also need to study the long-term effects of yogic treatment of hypertension.

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