Journal of Ayurveda and Integrative Medicine 13 (2022) 100657

Contents lists available at ScienceDirect

Journal of Ayurveda and Integrative Medicine

journal homepage: http://elsevier.com/locate/jaim

Review Article

Effect of om chanting and yoga nidra on blood pressure and lipid profile in hypertension – A randomized controlled trial

K. Anjana [a], R. Archana [b,*], J.K. Mukkadan [a]

[a] Department of Physiology, Little Flower Medical Research Center, Angamaly 683572, Kerala, India
[b] Department of Physiology, Saveetha Medical College, Saveetha Institute of Technical and Medical Sciences (SIMATS), Thandalam, Chennai 602105 Tamil Nadu, India

ARTICLE INFO

Article history:
Received 17 March 2022
Received in revised form
28 September 2022
Accepted 7 October 2022
Available online xxx

Keywords:
Yoga
Meditation
Yoga nidra
OM chanting
Blood pressure
Lipid profile

ABSTRACT

Background: Hypertension (HTN) is a major public health concern, and elevated blood pressure (BP) is a distinct risk factor for all - causes of morbidity and mortality.
Objectives: Considering the growing evidence of yoga interventions in the management of hypertension, the objective of the current randomized controlled study is to assess the effect of OM chanting and Yoga nidra (Relaxation technique) on BP and lipid profile in individuals with HTN.
Materials and methods: Eighty patients with diagnosed HTN were recruited and randomized equally to either the experimental group or the control group. Patients in the experimental group received a combination of OM chanting and Yoga nidra, five days a week for a period of 2 months and patients in the control group continued with their regular conventional medications. BP and lipid profile parameters were assessed at baseline, 30th day and 60th day for both the groups.
Results: After 2 months of intervention, a significant ($p < 0.05$) reduction in the BP and lipid profile was observed in the intervention group when compared to the control group. The reduction in systolic and diastolic BP and LDL were significantly ($p < 0.001$) higher in the experimental group. In addition, there is a significant increase in HDL levels in the experimental group. No adverse events were reported during the trial period.
Conclusion: The current study demonstrates the efficacy of Om chanting and Yoga nidra in reducing blood pressure and improving lipid profiles in patients with HTN. These particular yoga interventions could thus be considered a safer form of complementary therapy in the management of HTN, alongside conventional management.
Registration: Clinical trial identifier- CTRI/2020/02/023400.
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1. Introduction

Hypertension is a global public health challenge and elevated blood pressure is one of the leading risk factors for mortality globally [1]. Over 10.4 million deaths have been reported worldwide due to hypertension (HTN) and it is the most preventable and modifiable vascular risk factor for premature morbidity and mortality as well [2,3]. Dyslipidemia is a common metabolic abnormality observed in patients with hypertension. The pathological abnormalities due to dyslipidemia and elevated blood pressure lead to endothelial dysfunction, vascular inflammation, vascular remodeling and atherosclerosis [4]. Reduction in blood pressure, as little as 10 mm Hg in systolic blood pressure (SBP) and 4 mm Hg in diastolic blood pressure (DBP), is reported to reduce the risk of myocardial infarction and stroke by 23% and 30% respectively [5]. Thus, achieving even a smaller reduction in SBP and DBP through non-pharmacological means such as diet, exercise and complementary therapies like yoga would be of greater significance in the management of hypertension alongside conventional management.

Yoga is one of the most popular mind-body therapies widely practiced across the world. Various practices are involved in yoga including physical movements (asanas), controlled respiration (pranayama), relaxation and meditation (dhyana) [6]. The

* Corresponding author.
E-mail: professorarchana2017@gmail.com
Peer review under responsibility of Transdisciplinary University, Bangalore.

https://doi.org/10.1016/j.jaim.2022.100657
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beneficial effects of yoga on various aspects of hypertension are well-documented, especially with pranayama (breathing techniques), meditation and other relaxation techniques in the management of hypertension [7–9].

The American College of Cardiology/American Heart Association (AHA) task force guidelines have emphasized on the importance of lifestyle interventions such as regular exercise and yoga in the effective management of hypertension [10]. Keeping in mind the increase in cardiovascular mortality in low and middle income countries, a community based intervention would be a more effective strategy in the management of hypertension [11]. A simple mind-body intervention like yoga would help patients to practice in the comfort of their homes without much hassles. Most previous studies have focused on asanas and pranayama. There are multiple other simpler practices in yoga that could be performed across all age groups irrespective of the flexibility of a practitioner. However, these components of yoga are least explored scientifically. The objective of the current study is to understand and scientifically explore the effect of integrated relaxation practices of Yoga nidra and Om meditation on blood pressure and lipid profile in patients with elevated blood pressure.

2. Materials and Methods

2.1. Study design

This study was a prospective randomized controlled study conducted on patients with diagnosed HTN. The study was conducted in a private hospital and research center in rural Kerala, South India. BP measurement and lipid profile parameters were evaluated at baseline and after 2 months of intervention.

2.2. Subjects

Patients at Little Flower Medical Research Center, diagnosed with HTN, with a BP range of 130–139/80–89 mmHg, between 25 and 60 years of age were selected. The subjects were under a hypertension diet and taking essential pharmacological therapy. Exclusion criteria were patients with cardio-respiratory diseases, Neuroendocrine diseases, and patients who are practicing yoga or any form of exercise more than 3 days a week. Recruitment was done by giving fliers and were contacted by calling over the telephone. 80 patients who fulfilled the inclusion and exclusion criteria were recruited and randomly assigned to control group (n = 40) and experimental group (n = 40).

2.3. Randomization

For the process of recruitment, 320 patients with HTN were prescreened. Out of which, 117 patients were screened for eligibility and after applying further inclusion and exclusion criteria, 80 patients who provided informed written consents were randomly allocated to either intervention group (40) or control group (40) through block randomization method. Allocation concealment was done in a sequentially numbered opaque and sealed envelope (SNOSE method), handled by a researcher who was not directly involved in the study. Six patients from the experimental group and nine patients from the control group dropped out of the study.

2.4. Intervention

2.4.1. Om chanting

Patients were trained in 'Om' chanting by an experienced yoga trainer. The patients were trained to chant the vowel (O) part of the 'Om' followed by the consonant (M) part of the 'Om' for 20 s in each chanting. The O part was chanted for a shorter duration (1/3 part) followed by a prolonged M part (2/3 part). They were trained to chant 'Om' 3 times per minute for a period of 5 min.

2.4.2. Yoga nidra

After 'Om', yoga nidra developed by Swami Satyananda Saraswati, Bihar School of Yoga, India was given to the patients in a supine position for a period of 20 min [12]. All patients were instructed to remain in the lying down position and follow the instructions of the yoga trainer. The practice starts with instructions to relax their entire body and mind as per the instructions provided. Followed by stating a resolve/sankalpa. The sankalpa was given were same for all the subjects and was constant throughout the study period. The subjects were instructed to rotate their consciousness as per the instruction followed by breath awareness. The subjects were instructed to experience the different feelings and emotions and produce a creative visualization of images. They were asked to recollect the Sankalpa at this phase. The subjects were instructed gradually and carefully to return to the normal state.

No active intervention was scheduled for the control group and they continued with their regular medications and usual activities. They were asked to do the follow-up on every 30th and 60th day.

2.5. Outcome measures

BP measurement was carried out using a validated BP monitor (Omron Inc., Japan). After 10 min of rest in a sitting position, BP was estimated in the left arm. A fasting blood sample (5 mL) was collected for assessment of lipid profile markers such as triglyceride (TG), total cholesterol (TC), low-density lipoprotein (LDL), and high-density lipoprotein (HDL) at baseline, on 30th day and 60th day for all the patients.

2.6. Statistical analysis

Descriptive statistics were used to present the baseline characteristics of the data. Normally distributed quantitative data was presented by the mean and standard deviation (SD). Binary and categorical variables were presented using counts and percentages. Between group comparisons of study groups were analyzed using Independent T test or Mann Whitney U test based on normality. The corresponding p-value of less than 0.05 was considered significant for each outcome. All the data entered in Microsoft Excel, and analyzed using SPSS version 20.00.

3. Results

Baseline demographical details of the patients who participated in the present study are shown in Table 1. In the experimental

Table 1
Baseline characteristics of the study participants.

Variables	Control group n = 31	Experimental group n = 34	P value
Age (yrs, Mean, SD)	43.90 ± 9.24	49.13 ± 8.106	0.023*a
20-30 (n, %)	4 (13)	4 (13)	0.64#
30-40 (n, %)	10 (33.30)	12 (40)	
40-50 (n, %)	15 (50)	14 (46.70)	
50-60 (n, %)	2 (3.30)	4 (13.30)	
Gender (n, %)			
Male	14 (45.1)	15 (44.1)	0.34#
Female	17 (54.8)	19 (55.8)	
BMI (kg/m2)	24.31 ± 1.21	25.27 ± 1.38	0.95*

* Unpaired t test; # chi-square test.

Table 2
Within group comparison of blood pressure parameters among the study groups.

Blood pressure parameters	Experimental group				Control Group			
	Initial, Mean ± SD	30th day, Mean ± SD	60th day, Mean ± SD	P Value	Initial, Mean ± SD	30th day, Mean ± SD	60th day, Mean ± SD	P Value
SBP(mmHg)	137.53 ± 3.70	134.53 ± 4.66	129.93 ± 5.97	<0.001	133.13 ± 3.09	132.94 ± 2.83	132.88 ± 2.73	0.395
DBP(mmHg)	86.13 ± 2.40	83.93 ± 2.37	81.93 ± 2.43	<0.001	84 ± 4.42	83.69 ± 4.04	84.69 ± 2.57	0.051
PP(mmHg)	52.87 ± 5.77	51.33 ± 5.57	42.67 ± 3.65	<0.001	48.33 ± 4.55	48.13 ± 5.04	46.93 ± 3.27	0.221
MAP(mmHg)	103.72 ± 2.56	100.97 ± 2.81	99.23 ± 3.65	<0.001	100.38 ± 3.17	100.1 ± 2.71	100.75 ± 1.82	0.056
RPP (bpm-mmHg)	10446.67 ± 1063.87	10012.13 ± 967.53	9099.47 ± 887.03	<0.001	9973.75 ± 1293.86	9972.5 ± 1232.06	9974.81 ± 1188.13	0.869

Repeated measures ANOVA, P < 0.05 shows statistical significance.
SBP- systolic blood pressure, DBP- diastolic blood pressure, PP-pulse pressure, MAP-mean arterial pressure, RPP-rate pressure product.

group, the range of age varies from 34 to 60 years with an average of 49.13 ± 8.11 years and in the control group age varies from 25 to 58 years with an average of 43.90 ± 9.24 years. Gender is distributed almost equally in both groups as more than half of the population were females in both groups. BMI distribution shows that our study population is overweight.

3.1. Blood pressure variables

Within group comparison of study groups shows that in experimental group, compared to initial value, systolic blood pressure (SBP), diastolic blood pressure (DBP), pulse pressure (PP), mean arterial pressure (MAP), and rate pressure product (RPP) showed a significant reduction on 30th day and it was consistent on 60th day ($p < 0.001$). There was no statistically significant difference was obtained in control group during the study period. ($p > 0.05$). The changes in BP variables (SBP, DBP, PP, MAP and RPP) in the experimental group at various time points with a significant improvement ($p < 0.001$) post-intervention. The improvement in SBP (7.6 ± 3.58 vs 0.88 ± 1.01 mmHg), DBP (4.2 ± 1.52 vs. 1.81 ± 1.99 mmHg), PP (4.6 ± 3.86 vs 2.06 ± 2.12 mmHg), MAP (4.62 ± 1.68 vs 1.29 ± 1.37 mmHg) and RPP (1347.2 ± 459.58 vs. 128.69 ± 153.3 mmHg) for the experimental group at 60th day were significantly higher than control group (Table 2).

3.2. Lipid profile

There was significant improvement (Table 3) in serum lipid markers (TGL, VLDL, LDL, HDL, LDL/HDL and TC/HDL and total cholesterol) as well in the experimental group at the end of 30th day ($P < 0.001$) and 60th day of intervention ($P < 0.001$). Difference observed among the experimental group shows that Triglycerides (mg/dl), VLDL (mg/dl), LDL (mg/dl), TC (mg/dl), LDL/HDL, TC/HDL were showed statistically significant decrease on 30th day and on 60th day after receiving Om chanting and yoga nidra ($p < 0.05$) The HDL (mg/dl), values increased ($p < 0.05$) significantly during the study period. In the control group, there was no significant differences were observed during the study period. ($p > 0.05$). The mean difference of TGL (9.33 ± 1.69 vs 0.16 ± 0.63), VLDL (1.87 ± 0.34 vs 0.03 ± 0.13), HDL (4.43 ± 1.72 vs. 0.34 ± 0.87 mg/dl), LDL (9.74 ± 2.30 vs. 0.08 ± 0.26 mg/dl), LDL/HDL (0.64 ± 0.32 vs 0.04 ± 0.09) ratio, TC (6.43 ± 1.75 vs 0.46 ± 0.89) and TC/HDL ratio (0.79 ± 0.4 vs 0.05 ± 0.12) were significantly higher at the end of the 60th day.

4. Discussion

In the current study, the combination of the two relaxation practices- 'Om' chanting and Yoga nidra, showed a statistically significant reduction in SBP, DBP, PP, MAP and, RPP. Similarly, an improvement in the lipid profile was also observed in the intervention group.

The mechanism of action and impact of 'Om' chanting on breathing pattern is well-documented. During Om chanting, the breathing rate is slowed down and airway resistance is induced due to the laryngeal contraction to generate the particular sound and vibrational effects, thereby increasing the vagal tone, and resultant physiological relaxation via parasympathetic arousal [13,14]. The changes induced in the respiratory tract impact the ascending vagal activity which would produce a widespread action in critical regulatory centers of the brain. The parasympathetic nervous system (PNS) which gets stimulated by the neurotransmitter GABA from the pre-frontal cortex and insular cortex reduces the hyper activity of the amygdala [15]. Similarly, the changes in breathing patterns will increase the release of hormones such as oxytocin, vasopressin and prolactin, meanwhile reducing the stress markers such as cortisol, via the hypothalamo pituitary adrenal (HPA) axis [16,17]. Mind-body therapies such as yoga have already been shown to improve heart rate variability (HRV) in previous studies, especially slow breathing is reported to influence cardiovagal centers [18].

Previous studies have reported that 'Om' sound activates the middle frontal cortex and right supramarginal gyrus which are

Table 3
Within group comparison of lipid profile among the study groups.

Lipid Profile	Experimental group				Control Group			
	Initial, Mean ± SD	30th day, Mean ± SD	60th day, Mean ± SD	P Value	Initial, Mean ± SD	30th day, Mean ± SD	60th day, Mean ± SD	P Value
Triglycerides (mg/dl)	194.17 ± 73.27	190.17 ± 73.50	184.83 ± 72.67	<0.001	245.16 ± 45.22	244.94 ± 45.03	245 ± 45	0.097
VLDL (mg/dl)	38.8 ± 14.66	38.03 ± 14.59	37.03 ± 14.59	<0.001	49.03 ± 9.04	48.99 ± 9.01	49 ± 9	0.097
HDL (mg/dl)	40.10 ± 4.58	41.23 ± 4.47	44.53 ± 3.86	<0.001	35.13 ± 5.75	34.91 ± 5.44	34.78 ± 5.43	0.052
LDL (mg/dl)	164.9 ± 34.421	159.90 ± 34.39	155.93 ± 34.39	<0.001	166.58 ± 34.34	166.61 ± 34.37	166.66 ± 34.3	0.264
TC (mg/dl)	243.75 ± 35.07	239.08 ± 35.41	237.32 ± 35.07	<0.001	250.73 ± 35.5	250.51 ± 35.5	250.44 ± 35.5	0.326
LDL/HDL	4.17 ±0.98	3.83 ±0.91	3.50 ±0.777	<0.001	4.89 ± 1.37	4.91 ± 1.35	4.92 ± 1.34	0.070
TC/HDL	6.13 ± 1.104	5.8 ±0.92	5.37 ±0.765	<0.001	7.32 ± 1.58	7.35 ± 1.56	7.37 ± 1.55	0.054

Repeated measures ANOVA, P < 0.05 shows statistical significance.
TG-triglyceride, TC-total cholesterol, LDL-low density lipoprotein, HDL-high density lipoprotein.

neural systems associated with the emotion of 'empathy' [19] An fMRI study has demonstrated that 15 s loud 'Om' chanting stimulates the auricular part of the vagus nerve [20].

Similar to 'Om' chanting, Yoga nidra is also an equally effective relaxation practice. Yoga nidra is considered to be a state of relaxation with an altered state of consciousness [21]. The integrated response of Yoga nidra on the hypothalamus results in decreased sympathetic nervous system activity and simultaneously increases the parasympathetic activity as well, by possible activation of the HPA axis [22]. EEG studies showed an initial increase in the beta wave activity during the practice, indicating a calm state of mind being induced in the practitioners [23].

Serum cholesterol levels may be elevated during sympathetic overactivity. Chronic stress may raise cholesterol levels independent of dietary measures [24].

Studies on yoga nidra proved that Yoga nidra effectively reduces stress and anxiety [21].

Previous studies show that pranayama and yogasanas are effective in patients with defective lipid metabolism [25]. This might be due to the parasympathetic stimulatory activity of Om chanting and Yoga nidra [9].

4.1. Strengths and limitations of the study

The major advantage of the study was the intervention, which did not include any physical practices (such as asanas), which makes the current intervention simpler and easier for elderly patients to practice. Having no adverse events being reported by any of the participants is an added advantage. The intervention, in fact, could also be considered as a limitation, because the intervention used in the current study is a combination of two relaxation practices and therefore, the observed beneficial effects could not be attributed to any one single practice in particular.

4.2. Future direction

Future robust studies with adequate sample size would enable to consolidate our findings and help in understanding the beneficial effects of various individual components of yoga. The beneficial effects observed with the two relaxation practices is nevertheless a significant one and could be used as a complementary therapy in the conventional management of hypertension.

5. Conclusion

Combination of the two well-known relaxation practices in yoga has shown to be beneficial in the reducing high BP and lipid profile in patients with hypertension. With no adverse events being reported during the entire duration of the intervention, these specific yogic relaxation practices could be used as a complementary therapy alongside conventional management of hypertension.

Statement of ethics

This study was approved by institutional Ethical board (Ref: EC/26/2018)) from Little flower hospital and research center Angamaly, Kerala, and registered at clinical trial registry (CTRI/2020/02/023400). Written Informed consent was obtained from all the patients before commencement of the intervention.

Funding sources

No external funding sources were involved in any stage of this study.

Author contribution statement

Anjana.K: Conceptualization, Methodology, Formal analysis, Investigation, Resources, Data curation, Validation, Writing - original draft, Visualization. **Archana. R:** Conceptualization, Methodology, Formal analysis, Validation Writing - review & editing, Supervision. **Mukkadan. J.K:** Conceptualization, Methodology, Supervision.

Declaration of competing interest

The authors declare no conflict of interest.

Acknowledgements

Ms. Anitha Devi. T.S for all the help provided in statistical analysis. We are also grateful to the subjects who are participated in the study.

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