



CHANGES IN INFLAMMATORY BIOMARKERS IN HYPERTENSIVE SUBJECTS DUE TO OM CHANTING - A RANDOMIZED CONTROLLED TRIAL.

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Grants or other financial support used for the study; Nil

ABSTRACT

This randomized controlled trial aimed to find the effect of OM chanting and Yoga Nidra on the inflammatory biomarkers such as C reactive protein (CRP), neutrophil-lymphocyte ratio (NLR) and monocyte-lymphocyte ratio (MLR) in hypertensive subjects. The participants included both genders and were aged between 25-65 years. The subjects were randomly grouped into age and gender-matched groups. The experimental group received Om chanting and Yoga Nidra as the intervention and the control group were not practicing any intervention. Sample collection was done initially before the practice and on the 30th day and the 60th day after the practice. The total count, neutrophils and lymphocytes counts showed a significant difference ($p < 0.05$) in the experimental group. NLR and MLR and CRP were significantly changed in the experimental group on 60th day ($p < 0.05$). Therefore, OM chanting and Yoga Nidra are effective interventions on the inflammatory biomarkers among hypertensive subjects.

KEYWORDS: C Reactive protein, Om chanting, Yoga nidra, inflammatory bio markers, MLR, NLR

DOI Number: 10.14704/nq.2022.20.8.NQ44361

NeuroQuantology 2022; 20(8): 3321-3326



INTRODUCTION

Hypertension is the most common global disease burden. Uncontrolled hypertension contributes to cardiovascular diseases and ischemic heart diseases.^[1] Stress and sleep deprivation has been associated with greater cardiovascular risk, and stress management is a recommended intervention for hypertensive.^{[2][3]} Growing evidences shows that stress and inflammation has a pivotal role in the pathogenesis of cardiovascular diseases, metabolic diseases and neurodegenerative diseases.^[4]

CRP levels, neutrophil-to-lymphocyte ratio (NLR), monocyte-lymphocyte ratio (MLR) are considered the most inexpensive and readily available hematological biomarkers in hypertension. High CRP levels indicate a higher risk of developing hypertension in non-hypertensive subjects.^[5]

meditation and yoga are considered to be complimentary mind and body health approaches.^[6]

Studies shows that a relaxation response is elicited when focusing on a word, a repeated prayer, or a movement. Different yoga practices, such as asanas, breathing exercises, meditation, and relaxation, effectively induce the relaxation response ^[7].Yoga Nidra systematically induces a state of physical, mental and emotional relaxation. ^[8] Which reflect an integrated response by the hypothalamus resulting in decreased sympathetic nervous activity (excitatory) and increased parasympathetic (relaxatory) function.^[9]

It has been proved that chanting or meditating on Om can produce a peaceful mental state. ^[10]. Loud Om chanting can be considered an introductory practice for meditation, and it may produce a higher level of concentration.^[11]. Studies on Om in hypertensive subjects shows that practice of pranava pranayama in supine position reduces heart rate and systolic pressure.^[12]

From this point of view, this study assesses the effect of two relaxation practices such as OM

chanting and Yoga Nidra on CRP, MLR, and NLR in hypertensive subjects.

METHODOLOGY

Study design

This randomized controlled trial was conducted on the hypertensive adults from Little Flower Hospital and research center Ernakulum, Kerala.

Subjects

The subjects underwent a stepwise screening before being entitled to the study. The participants included from both genders and were aged between 25-65 years. Subjects were naïve to yoga and meditation practices and non-smokers and non-alcoholics. Subjects having severe cardio-respiratory diseases, neuroendocrine problems, or undergoing any elective surgery during the study period were excluded.

The subjects were randomly grouped into age and gender-matched groups by block random method, having a sample size of 40 in each group. Group 1 is the control group, where the subjects are not practicing any intervention. The group 2 experimental group received OM chanting and Yoga Nidra as the intervention.

Intervention

The intervention was detailed by a qualified yoga practitioner and regular instructions of Om chanting and Yoga Nidra were given to the experimental group. The intervention was given everyday morning (7-7.30am) for 60 days. The subjects practice OM chanting (5 minutes/15 rounds) during the study period, followed by Yoga Nidra for 20 minutes. ^[8].

Sample collection

A 5ml venous blood was taken under aseptic conditions after 12 hours of fasting. Sample collection was done for assessing total WBC count, differential cell count and C - reactive protein levels. MLR was calculated by dividing the monocyte count by lymphocyte count and NLR was determined by dividing neutrophil count by lymphocyte count initially prior to the practice and on the 30th day and the 60th day after the practice.

Statistical analysis



The data was entered in Microsoft Excel sheets, and analysis was done using the SPSS software version 20.00. Descriptive statistical methods were used to assess the baseline data. Categorical variables are presented as frequency and percentages and continuous variables in mean and standard deviation. For assessing normality Shapiro Wilk test was used. For the comparison of initial to two posts of time points, repeated measures ANOVA were used. An independent T-test was used for normal variables .A p-value <0.05 was considered as statistically significant.

RESULTS

The baseline characteristics of the study participants are depicted in **Table 1**. The mean (SD) age of the control group was 43.9 (9.2) years, and the experimental group was 49.1 (8.1) years (p=0.023). There were equal

distribution of males and females (45% vs 44%, p=0.64) and the mean (SD) BMI was comparable at baseline [24.3 (1.2) vs 25.3 (1.4) kg/m², p=0.95].The comparison of the total count and differential count among the study groups have been shown in **Table 2**. The total count showed a significant decrease in experimental group compared to control group (P<0.05). Neutrophils, lymphocytes and monocytes showed a significant difference only in the experimental group, not in the control group. Eosinophils did not show any difference in both the groups on the 30th and 60th days. **Table 3**. Describes the comparison of inflammatory markers among the study groups. In experimental group NLR , MLR and CRP levels were significantly decreased (P<0.05) on 60th day compared to the control group.

Table: 1 Baseline characteristics of the study participants

Variables	Control group n=31	Experimental group n=34	P value
Age in years, mean (SD)	43.90±9.24	49.13±8.106	0.023* ^a
Age categories			
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			
Male, n (%)	14(45.1)	15 (44.1)	0.34 [#]
Female (n, %)	17 (54.8)	19(55.8)	
BMI (kg/m ²), mean (SD)	24.31±1.21	25.27±1.38	0.95*

* Unpaired t test; # chi-square test



Table 2: Comparison of total count and differential count among the study groups

Blood Parameters	Control group			P Value	Experimental group			P Value
	Baseline	30 th day	60 th day		Baseline	30 th day	60 th day	
Total Count Cells /mm³	8241.94±1858.81	8309.68±1845.78	8332.9±1846.43	0.026*	8555.88±1659.9	8311.76±1851.74	8364.71±2049.67	<0.001*
Neutrophils %	60.65±5.94	60.81±6.39	61.42±7.49	0.266	62.26±7	61.59±5.95	60.06±4.29	0.011*
Lymphocytes%	35.81±5.61	35.71±4.2	35.13±7.03	0.331*	34.88±7.21	35.53±6.13	37.62±4.93	<0.001*
Eosinophils%	3.03±1.05	2.81±0.91	2.81±0.83	0.331	3.24±1.07	3.24±1.07	3.18±1.14	0.368
Monocytes%	2.42±0.5	2.42±0.5	2.45±0.51	0.819	1.82±0.76	1.91±0.79	1.53±0.56	0.003

Repeated measures ANOVA, P<0.05 shows statistical significance

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Table 3: Comparison of inflammatory markers among the study groups

Inflammatory markers	Control Group			p Value	Experimental group			p Value
	Initial	30th Day	60th Day		Initial	30th Day	60th Day	
N/L	1.75±0.43	1.75±0.38	1.89±0.77	0.265	1.92±0.74	1.81±0.48	1.63±0.3	0.003*
M/L	0.07±0.02	0.07±0.02	0.07±0.02	0.226*	0.05±0.03	0.05±0.02	0.04±0.02	<0.001*
CRP mg/dl	1.94±0.72	1.93±0.72	1.94±0.78	0.442	2.07±0.74	1.95±0.82	1.36±0.51	<0.001*

Repeated measures ANOVA, P<0.05 shows statistical significance

DISCUSSION

Studies shows that sympathetic system activation produces a high neutrophil count and inflammatory response.^[13] Relaxation techniques produce a decrease in sympathetic activity with significant reduction in oxygen consumption, HR, and skin conductance. This will produce a decreased low-frequency (LF) power and increased high frequency HF power of the HRV spectrum.^[4]

The long-term elicitation of relaxation procedures may improve mitochondrial energy

production and utilization. This may reduce stress and produce parasympathetic activation.^[14,15] Relaxation techniques may favorably alter autonomic nervous system balance and/or the hypothalamic-pituitary-adrenal axis.^[16] During Om chanting, there will be a significant change in the breathing pattern. The Om chant involves slow breathing and airway resistance due to contraction of the vocal cords to generate sound, and vibrational effects, which increase vagal tone and physiologic relaxation. Parasympathetic arousal during relaxation



practices will reduce the inflammation by anti-inflammatory cholinergic pathway. ANS and HPA axis activity increases the anti-inflammatory activity by producing a relaxation response by down streaming the neural areas, which activates during the stress response.^[17]

From previous studies, it is evident that Mindfulness mediation reduces pro-inflammatory cytokines and CRP levels which is reflected in our study also. ^[18,19]Increase in total count, neutrophil count, monocyte count, low lymphocyte levels and increased MLR and NLR ratio are independent risk factors in hypertension and related cardiovascular diseases.^[20-25]In the present study there is a significant reduction in NLR, MLR, total WBC count and neutrophil count. There is significant increase in lymphocyte count. This shows that the combination of two relaxation practices such as Om chanting and Yoga nidra significantly reduces the inflammatory markers. To the best of our knowledge, this is the first attempt to assess the effect of two relaxation practices such as OM chanting and Yoga Nidra on CRP, NLR, and MLR in hypertensive subjects. There were no adverse effects reported during the study period.

CONCLUSION

Inflammatory biomarkers such as CRP, MLR, and NLR were significantly improved in the experimental group. Therefore, OM chanting and Yoga Nidra are effective interventions among hypertensive subjects to reduce biomarkers such as CRP, MLR, and NLR.

CONFLICTS OF INTEREST:

The authors declare no conflict of interest.

Ethical approval

This study was registered under the clinical trial registry of India, and the clinical trial identifier is CTRI/2020/02/023400. Subjects were recruited after getting the Institutional ethical clearance (Institutional ethical clearance number :EC/26/2018) from Little flower hospital and research center Angamaly, Kerala, and written informed consent was taken from the subjects after explaining the procedure.

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