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Original Research Article

Om Chanting and Health: Insights into Cardiovascular and Respiratory Physiology

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Abstract:

Background: 'Om' chanting, an ancient practice rooted in Hindu scriptures, symbolizes the universe's essence and is believed to promote physiological balance through rhythmic sound vibrations. It is thought to influence autonomic functions and has been associated with relaxation effects similar to meditation.

Aim: This study aimed to investigate the effects of 'Om' chanting on heart rate, blood pressure, and respiratory endurance in healthy adults over a 4-week period.

Methods: A total of 63 healthy volunteers aged 18-50 years participated in this cross-sectional prospective study. Baseline measurements of heart rate, blood pressure, and respiratory endurance were taken. Participants underwent a 5-minute 'Om' chanting session daily for 4 weeks. Immediate post-chanting measurements and measurements after 4 weeks were compared using paired t-tests.

Results: Significant reductions were observed in pulse rate (from 80.65 ± 8.92 to 76.91 ± 7.09 beats per minute) and systolic blood pressure (from 113.37 ± 9.4 to 110.13 ± 9.85 mm Hg) immediately after 'Om' chanting, and these effects were sustained after 4 weeks. Respiratory endurance, measured by the blast test, 40 mm Hg test, and breath-holding times, significantly improved after 4 weeks of chanting.

Conclusion: 'Om' chanting demonstrated beneficial effects on heart rate, blood pressure, and respiratory endurance in healthy adults. These findings suggest that regular practice of 'Om' chanting could be considered as a preventive or rehabilitative measure for individuals with hypertension, anxiety, or respiratory disorders. Further research is warranted to explore its underlying physiological mechanisms and potential clinical applications.

Keywords: Respiratory endurance, Om Chanting, Yogic Breathing.

Introduction

Our ancient Hindu scriptures like Bhagwat Gita say that 'Om' means the Brahmand and the person who is engaged in the practice of uttering the mono-syllable 'Om' with concentration and who remembers it always will attain the supreme goal [1]. In Hindu tradition, the sound 'Om' is said to contain the entire universe. It is also a seed syllable used as a building block for other mantras. The word 'Om' is a combination of A, U, M which symbolizes the three states of consciousness i.e. waking state, dream state, and deep sleep state respectively [2]. Om' may just be a two-letter word but it has power of whole universe [3]. As such by chanting it, we are symbolically tuning ourselves with nature. In this fast-moving world and increasing stress in individual's life, man has lead his life to deviate from the balanced physiological state. Rhythmic pronunciation and vibrations of 'Om' create a calming effect on body and nervous system similar to effects of meditation. It has been reported that these yoga practice promotes sympatho-vagal balance which improve autonomic functions. In a previous study on neuro-hemodynamic correlates of 'Om' chanting showed limbic deactivation and similar observations were recorded in vagal nerve stimulation used in the treatment of depression [4,5] . In today's scenario, where everyone is short of time, practicing 'Om' chanting for only 5 mins daily

can benefit a person. With increasing stress, workload the number of hypertension cases are also increasing and about 33% of urban and 25% rural individuals are hypertensive [6]. Medical treatment in combination with 'Om' chanting can improve the wellbeing of such patients. Studies have reported that effective 'Om' chanting causes vibration around ears which stimulates vagal nerve, hence stimulation of parasympathetic nervous system due to chanting could demonstrate its effect on blood pressure and heart rate [7]. It has been also found useful in chronic obstructive pulmonary diseases and bronchial asthma [8]. 'Om' chanting is an important breathing exercise and other than its effect on sympatho-vagal balance and autonomic functions it may have its direct effect on strengthening of the respiratory muscles.

Although we could not find any studies which looked for the effect of solely 'Om' chanting on respiratory endurance and vitals in healthy adults. Regular 'Om' chanting can have preventive as well as rehabilitative importance, apart from the much talked about therapeutic importance in the various lifestyle disorders prevailing these days. This study will focus on the effect of 'Om' chanting on the respiratory muscle endurance in the long term (4 weeks) and also on its immediate and long-term effect on heart rate and Blood pressure in healthy adults.

This will uncover some more physiological effects of this simple but powerful yoga practice and help us promoting it as a prevention and rehabilitation tool for people suffering from lifestyle disorders like hypertension, anxiety and respiratory disorders

Material and Methods

This experimental study was conducted in the Department of Physiology at NIMS Medical College from July 2019 to September 2019. A total of 63 healthy volunteers aged between 18 and 50 years participated in the study.

The study employed a cross-sectional prospective design. The study population included medical students, teaching faculty, non-teaching staff, and paramedical staff working in our medical college and hospital. Initially, 70 volunteers were registered, anticipating some dropouts, to ensure a minimum of 50 participants. Ultimately, 63 volunteers completed the study, comprising 33 males and 30 females.

The inclusion criteria were males and females aged 18 to 50 years who were not on any regular medications. The exclusion criteria were a history of cardiovascular, respiratory, or neurological diseases; indulgence in addictions such as alcohol, smoking, or tobacco chewing; diagnosis of diabetes mellitus, thyroid disorders, or hypertension; engagement in other exercise routines that could affect the study parameters; and prior practice of yoga, meditation, or stress reduction techniques.

During the initial contact, volunteers underwent a detailed clinical history and general examination for recruitment. They received comprehensive information about the study through a PowerPoint presentation and an information sheet, followed by written informed consent. Baseline parameters were measured, including height, weight, BMI, pulse rate, and blood pressure, along with respiratory endurance and breath-holding times.

Table 1: Baseline Parameters and Instruments Used for Measurement

Parameter	Instrument
Height	Stadiometer
Weight	Standard Weighing Machine
BMI	Calculated (kg/m²)
Pulse Rate	Palpation of right radial artery (1 minute)
Blood Pressure	Diamond Mercury Sphygmomanometer
Blast Test	Diamond Mercury Sphygmomanometer
40mmHg Endurance Test	Diamond Mercury Sphygmomanometer
Breath-Holding Time (inspiration)	Stopwatch
Breath-Holding Time (expiration)	Stopwatch

Height was measured using a stadiometer, and weight was measured using a standard weighing machine. BMI was calculated using the formula kg/m². Pulse rate was determined by palpating the right radial artery for one minute. Blood pressure was measured using a Diamond Mercury Sphygmomanometer with both palpatory and auscultatory methods. Respiratory endurance was assessed with two tests: the blast test and the 40mmHg endurance test. In the blast test, participants took a full inspiration and blew against the mercury column, noting the maximum pressure reached. In the 40mmHg endurance test, participants maintained the mercury column above 40 mm Hg for as long as possible the time (in seconds) for which the student could maintain the mercury level at or above 40 mm Hg was noted. Breath-holding times at the end of inspiration (BHTi) and expiration (BHTex) were measured with a stopwatch. All the parameters taken and the instrument used to take the same parameter are shown in table number 0. Over a 15-day period, 70 subjects were registered, averaging five subjects per day for the introductory session. Participants sat on a yoga mat in Dhyana

Asana for 5 minutes in a silent room. Baseline measurements of pulse rate, blood pressure, and breath-holding times were taken before the meditation practice. Participants were then guided through 5 minutes of 'Om' chanting by an expert facilitator, sitting in the same position. They were instructed to close their eyes, inhale deeply, and exhale while chanting 'Om' until they could no longer exhale. Immediate post-chanting measurements of blood pressure and pulse rate were taken. Participants were asked to continue 'Om' chanting for 5 minutes daily for 4 weeks at a convenient, silent place of their choice. After 4 weeks, the same parameters (BP, pulse rate, and respiratory endurance) were measured again.

Result and observations

Data was entered into Microsoft Excel. The comparison of blood pressure and pulse rate before and immediately after the 'Om' chanting session, as well as the comparison of baseline blood pressure, pulse rate, breath-holding time, and respiratory endurance with values after 4 weeks of regular 5-minute 'Om' chanting, was performed using paired 't' tests and other relevant statistical tools. A p-value of less than 0.05 was considered significant.

The study involving 63 subjects aged 18 to 50 years, with a mean weight of 65.68 kg, found significant physiological changes following 'Om' chanting. Immediately after chanting, there was a notable decrease in pulse rate (from 80.65 ± 8.92 to 76.78 ± 9.16 per minute) and systolic blood pressure (from 113.37 ± 9.4 to 109.87 ± 9.49 mm Hg), both highly significant ($p<0.05$), while diastolic blood pressure changes were not significant. After 4 weeks of regular 'Om' chanting, significant reductions were observed in pulse rate (to 76.91 ± 7.09 per minute) and systolic blood pressure (to 110.13 ± 9.85 mm Hg).

Respiratory endurance also improved significantly, with increases in Blast test, 40 mm Hg test, and Breath Holding Time (BHT) after inspiration and expiration. A significant negative correlation was found between BMI and systolic blood pressure, and a positive correlation with diastolic blood pressure.

Table 2: Descriptive statistics of general characteristics of subjects.

Variables	Mean ± SD
Age (in Years)	23.19 ± 5.63
Height (in Centimeters)	166.78 ± 7.65
Weight (in Kgs)	65.68 ± 12.96
BMI (in kg/m^2)	23.53 ± 3.12
Sex ratio (Male: Female)	33:30

Table 3: Descriptive statistics of effect of 'Om' chanting on Blood pressure and Pulse rate

Variables	Baseline Parameters before intervention	Immediately effect of Om chanting	After 4 weeks of regular 'Om' Chanting
	Mean ± SD	Mean ± SD	Mean ± SD
Systolic BP	113.37 ± 9.4	109.87 ± 9.49	110.13 ± 9.85
Diastolic BP	77.03 ± 9.17	77.4 ± 8.88	77.81 ± 8.09
Pulse rate	80.65 ± 8.92	76.78 ± 9.16	76.91 ± 7.09

Table 4: Comparing the Blood pressure and pulse rate, before and immediately after 'Om' chanting

Variables	Baseline Parameters before intervention	Immediately effect of Om chanting	P-Value	Significance
Systolic BP (mm of Hg)	113.37	109.87	0.00004	Highly Significant
Diastolic BP (mm of Hg)	77.03	77.4	0.6563	Not Significant
Pulse rate (per minute)	80.65	76.78	0.0023	Highly Significant

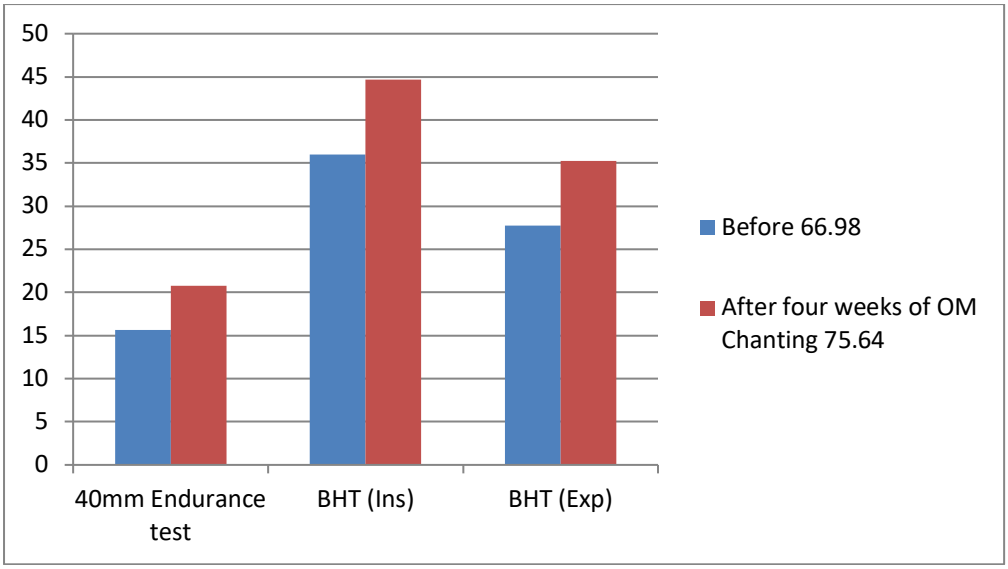

Figure 1: Immediate Impact of 'Om' Chanting on Blood Pressure and Pulse Rate

Immediate Effects of 'Om' Chanting: Pulse Rate: 44 out of 63 subjects showed a significant decrease in pulse rate, with the mean dropping from 80.65 ± 8.92 to 76.78 ± 9.16 per minute ($p<0.05$) (Table 3, Figure 1).

Systolic Blood Pressure (SBP): 49 subjects experienced a significant decrease in SBP, with the mean reducing from 113.37 ± 9.4 mm Hg to 109.87 ± 9.49 mm Hg ($p<0.05$) (Table 3, Figure 1).

Diastolic Blood Pressure (DBP): Changes in DBP were not statistically significant. The mean variation was less than 1 mm Hg, with 33 subjects showing a slight decrease, 19 an increase, and 10 no change (Table 3, Figure 1).

Table 5: Comparing the baseline Blood pressure and pulse rate, after 4 weeks of regular 'Om' chanting using paired t-test

Variables	Baseline Parameters before intervention	4 weeks of regular Om chanting	P-Value	Significance
Systolic BP (mm of Hg)	113.37	110.13	0.0012	Highly Significant
Diastolic BP (mm of Hg)	77.03	77.81	0.4351	Not Significant
Pulse rate (per minute)	80.65	76.91	0.0023	Highly significant

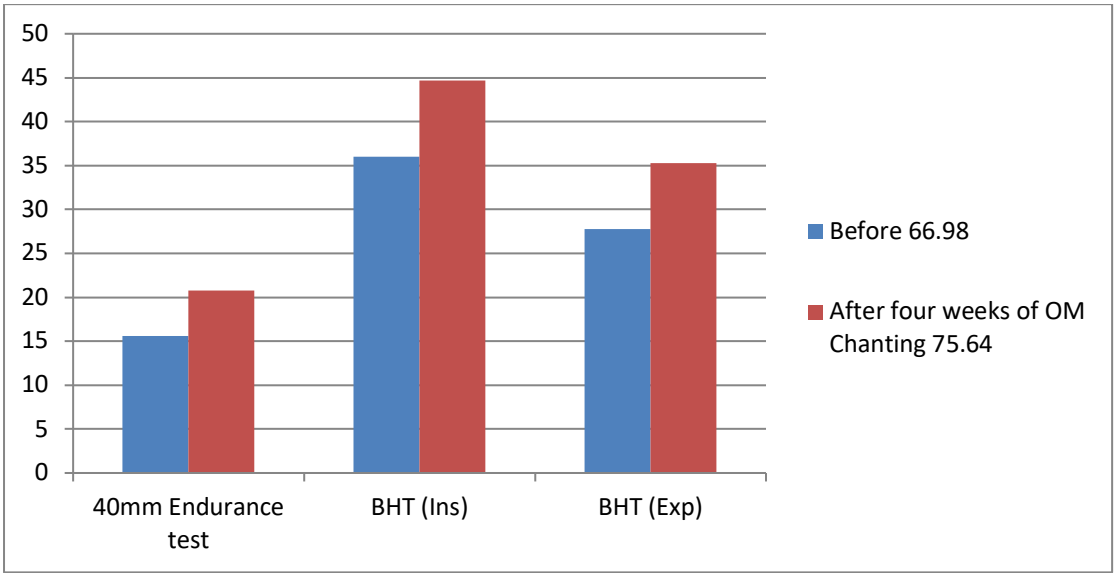

Figure 2: Changes in Blood Pressure and Pulse Rate after Four Weeks of 'Om' Chanting

Effect of 4 Weeks of Regular 'Om' Chanting:
Pulse Rate: After 4 weeks, 46 subjects showed a

decrease in pulse rate, with the mean dropping from 80.65 ± 8.92 to 76.91 ± 7.09 per minute ($p<0.05$) (Table 3, Figure 2).

Systolic Blood Pressure (SBP): 46 subjects also experienced a significant decrease in SBP, with the mean reducing from 113.37 ± 9.4 mm Hg to 110.13 ± 9.85 mm Hg ($p<0.05$) (Table 3).

Diastolic Blood Pressure (DBP): Changes in DBP remained statistically insignificant, with a mean variation of less than 1 mm Hg (Table 5, Bar diagram 2).

Table 6: Comparing the parameters for respiratory endurance before and after 4 weeks of regular 'Om' Chanting

Variables	Baseline Parameters before intervention	After 4 weeks of regular 'Om' Chanting
	Mean ± SD	Mean ± SD
Blast test (mm of Hg)	66.98 ± 24.57	75.64 ± 24.91
40mm Hg test (seconds)	15.61 ± 9.93	20.75 ± 12.46
BHT (after full inspiration in seconds)	36.01 ± 14.41	44.67 ± 18.24
BHT (after expiration inspiration in seconds)	27.77 ± 14	35.24 ± 16.63

Table 7: Comparing the parameters for respiratory endurance before and after 4 weeks of regular 'Om' Chanting using paired t-test

Variables	Baseline Parameters before intervention	After 4 weeks of regular 'Om' Chanting	P-Value	Significance
Blast test (mm of Hg)	66.98	75.64	0.00000	Highly Significant
40mm Hg test (seconds)	15.61	20.75	0.00011	Highly Significant
BHT (after full inspiration in seconds)	36.01	44.67	0.00001	Highly Significant
BHT (after expiration inspiration in seconds)	27.77	35.24	0.00001	Highly Significant

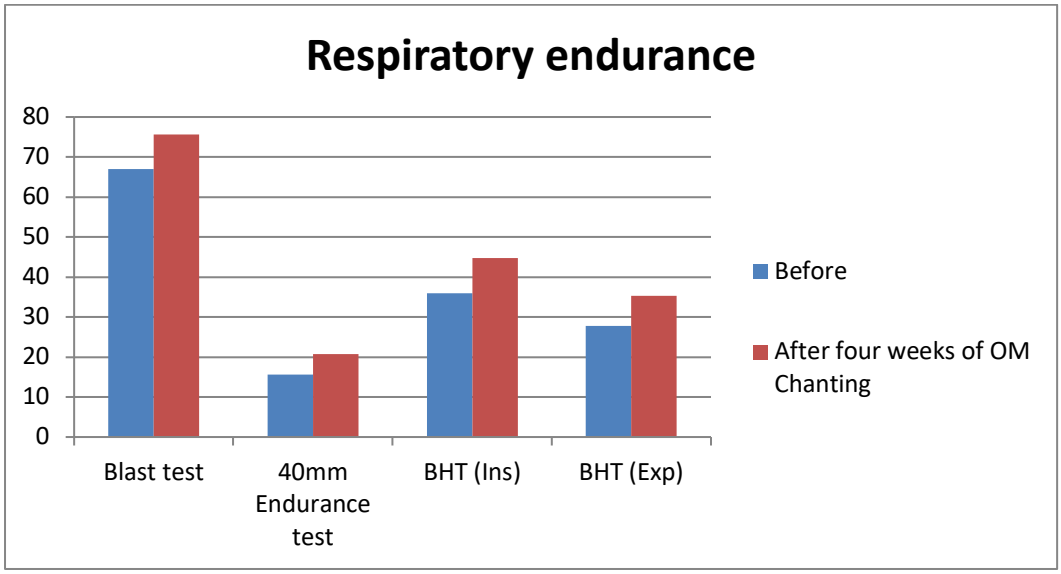

Figure 3: comparing the parameters for respiratory endurance before and after 4 weeks of regular 'Om' Chanting

Respiratory Endurance:

Significant improvements were observed after 4 weeks of 'Om' chanting in the 40 mm endurance test, Blast test, and Breath Holding Time (BHT) after inspiration and expiration. These differences were statistically significant ($p<0.05$) (Tables 6 and 7, Bar diagram 3).

Discussion

Our prospective study followed 63 healthy subjects (aged 18 to 50 years) who were not practicing any yoga, meditation, or exercise prior to the study.

The results indicated a significant drop in mean systolic blood pressure (SBP) and pulse rate immediately after 5 minutes of 'Om' chanting, as well as in the baseline SBP and pulse rate after 4 weeks of regular 'Om' chanting. Additionally, there was a statistically significant increase in respiratory

endurance parameters, including the respiratory blast test, 40 mm endurance test, and breath holding time (BHT), after 4 weeks of regular 'Om' chanting.

In a study by Arora and Dubey, 2018, similar immediate benefits of 'Om' chanting were observed in moderate uncomplicated hypertensive subjects, showing a significant reduction of 14/05 mmHg in blood pressure and 6 beats per minute in pulse rate after 5 minutes of chanting (Arora and Dubey, 2018) [9]. Our study found a statistically significant decrease in mean SBP of 3 mm Hg and a significant drop in pulse rate of 4 beats per minute.

However, the change in mean diastolic blood pressure (DBP) was less than 1 mm Hg and not statistically significant. The effects of 'Om' chanting can be attributed to its influence on autonomic functions, promoting Psychophysiological relaxation. Previous studies have reported that effective 'Om' chanting stimulates the Vagal nerve and deactivates the limbic system (Kalyani et al., 2011; Mooventhan and Khode, 2014) [10,11].

Our study's findings on SBP and pulse rate align with those of previous research, even in healthy subjects, suggesting similar effects as observed in hypertensive patients (Aanchala et al., 2014) [12]. The non-significant effect on DBP in healthy adults might be due to the shorter study duration, as other studies with longer interventions, such as those by Andrews et al. and Ather Ali et al., showed significant results over three months (Andrews et al., 2016; Ather Ali et al., 2014).

We found a positive correlation between BMI and DBP, consistent with established research that higher BMI correlates with increased DBP (Dua et al., 2014) [13]. Although the short-term intervention did not show significant changes in DBP, the positive correlation suggests that higher BMI might allow for more noticeable improvements over time.

The effect of 4 weeks of 'Om' chanting on respiratory endurance was promising, with significant increases in the respiratory blast test, 40 mm endurance test, and BHT. Gayatri Bora et al. reported similar improvements in PEFR and BHT, indicating that even short-term meditation can enhance respiratory functions (Bora et al., 2013) [14]. Studies by Mooventhan and Khode on Bhramari pranayama and 'Om' chanting showed improvements in pulmonary function, attributed to the prolonged inspiration and expiration during the practices (Mooventhan and Khode, 2014) [15]. Lata M. Mullur et al. found similar benefits in pulmonary functions through a combined approach of yoga practices, indicating the efficacy of such interventions across different age groups (Mullur et al., 2014) [17].

Slow breathing techniques, including 'Om' chanting, enhance ventilation efficiency and arterial oxygenation by increasing tidal volume and diaphragmatic excursion (Russo et al., 2017)16. The rhythmic recitation of 'Om' synchronizes and reinforces cardio-respiratory rhythms and modifies chemoreceptor sensitivity (Ma et al., 2017) [15]. These mechanisms likely contribute to the increased respiratory endurance and BHT observed in our study.

While previous studies have not focused exclusively on 'Om' chanting's impact on respiratory endurance, our findings suggest that even a short-term practice can significantly enhance respiratory muscle power and overall respiratory function. This could be beneficial for rehabilitating patients with chronic respiratory diseases or those with sedentary lifestyles. 'Om' chanting, a practice from ancient Hindu scriptures is an accessible form of slow, diaphragmatic breathing combined with meditation, beneficial for various bodily systems and suitable for people of all ages and abilities. Further exploration of its potential is warranted to fully uncover its benefits.

Conclusion

This study highlights that 'Om' chanting effectively reduces systolic blood pressure and pulse rate immediately after sessions and over a 4-week period. It also enhances respiratory endurance as measured by various tests. These findings suggest that regular 'Om' chanting could be beneficial for cardiovascular health and respiratory function, making it a potential tool for managing chronic respiratory conditions and lifestyle-related disorders.

Additional Information

Author's Contribution

- Vishwas Mahajan: Contributed to data collection and statistical analysis, and also provided clinical insights into cardiovascular parameters.
- Ketaki Poorey: Conceived the study design, supervised the project, and contributed to the manuscript writing.
- Mudasir Shafi: Assisted in the study methodology, data interpretation, and drafting the discussion.
- Abid Manzoor: Contributed to the literature review and helped in coordinating the data collection process.
- Sachin Khandelwal: Involved in volunteer recruitment, baseline measurements.
- Adil Abbass: Assisted in drafting the manuscript and final review before submission.

Limitations of the Study

1. The sample size was relatively small and limited to healthy volunteers, which may affect the generalizability of the results to other populations.
2. The study duration of 4 weeks was short, and the long-term effects of 'Om' chanting on cardiovascular and respiratory parameters remain unexplored.
3. Participants were not monitored for adherence outside the study setting, which could introduce variability in the results.

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