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Effect Of Om Chanting And Bhramari Pranayama On Pulmonary Function Tests In Post-COVID Medical Students Of Pandit Jawahar Lal Nehru Government Medical College And Hospital, Chamba, Himachal Pradesh, India

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Background
The COVID-19 pandemic has significantly impacted respiratory health and mental well-being, particularly among healthcare students. Post-COVID individuals often experience lingering respiratory dysfunction and autonomic imbalance. Yogic breathing practices such as OM chanting and Bhramari Pranayama have shown promising effects on pulmonary function and autonomic regulation but remain underexplored in post-COVID populations, especially among medical students in rural regions like Himachal Pradesh.

Objective
To evaluate the effect of OM chanting and Bhramari Pranayama on pulmonary function parameters in post-COVID medical students of Pandit Jawahar Lal Nehru Government Medical College and Hospital, Chamba, Himachal Pradesh.

Material and method

A pre-post interventional study was conducted on 109 post-COVID medical students over a 30-day period. Participants performed OM chanting (10 minutes/day) and Bhramari Pranayama (5 minutes/day) under guided supervision. Pulmonary function tests, including Tidal Volume (TV), Vital Capacity (VC), Forced Vital Capacity (FVC), Forced Expiratory Volume in 1 second (FEV_1), and FEV_1/FVC ratio, were measured before and after the intervention using standard spirometry. Data were analysed using paired t-tests.

Results
Statistically significant improvements were observed in FVC, FEV_1, VC, and ERV ($p < 0.05$). Non-significant trends were noted in IRV, IC, TV, and respiratory rate. The FEV_1/FVC ratio showed a statistically significant change but remained within the normal clinical range. These findings suggest improved ventilatory efficiency and potential autonomic benefits.

Conclusion
Regular practice of OM chanting and Bhramari Pranayama significantly improved pulmonary function in post-COVID medical students. These non-pharmacological, cost-effective interventions may support post-COVID recovery programs.

Keywords: OM chanting, Bhramari Pranayama, Pulmonary Function Tests, Post-COVID, Medical Students, Spirometry

Introduction

COVID-19, caused by SARS-CoV-2, has profoundly impacted global health, with respiratory and systemic complications persisting even after recovery. These post-acute sequelae, known as Long COVID or post-COVID Syndrome, include breathlessness, fatigue, and autonomic dysfunction, affecting physical and mental well-being across all age groups [1-5]. Medical students, a high-stress demographic, are particularly susceptible to such post-COVID complications due to academic pressure and clinical exposure.

Pulmonary function impairments such as reduced FVC and FEV_1 have been documented in post-COVID patients, often requiring a structured rehabilitation [6-9]. In this context, non-pharmacological approaches like yogic breathing offer promising results. Bhramari Pranayama, which involves humming during exhalation, and OM chanting, a resonant vocalization rooted in traditional Indian practices, have been shown to stimulate the vagus nerve, improve parasympathetic activity, and enhance lung function [10-13].

Despite growing interest, there is limited scientific literature assessing these interventions in post-COVID young adults, particularly medical students. This study aims to evaluate the effect of OM chanting and Bhramari Pranayama on Pulmonary functions in post-COVID medical students from a rural tertiary care setting in Himachal Pradesh**.**

Objectives

The main objective of this study was to find out whether OM chanting and Bhramari Pranayama could help improve lung function in medical students who had recovered from COVID-19. To do this, we measured several breathing-related parameters before and after the intervention. These included Forced Vital Capacity (FVC), Forced Expiratory Volume in one second (FEV_1), the FEV_1/FVC ratio, Vital Capacity (VC), Tidal Volume (TV), Inspiratory and Expiratory Reserve Volumes (IRV and ERV), Inspiratory Capacity (IC), and the Respiratory Rate (RR). By comparing the results from before and after the 30-day breathing practice, we aimed to see whether these simple, non-medical techniques could support better lung health in post-COVID students.

Materials and methods

Study design and area

This was a prospective cohort interventional study conducted in the Department of Physiology and Darbar Hall at Pandit Jawahar Lal Nehru Government Medical College and Hospital (Pt. JLNGMCH), Chamba, Himachal Pradesh, India. The study aimed to evaluate the effects of OM chanting and Bhramari Pranayama on pulmonary function in post-COVID medical students.

Study duration and participants

The study was carried out over 12 months, from December 2023 to November 2024. A total of 109 post-COVID medical students between the age of 18 and 25 years, from first-year MBBS to internship level, who met the inclusion criteria were enrolled.

Inclusion criteria

1) The medical students between age group of 18 to 25 years who had suffered Covid-19 infection and in whom clinical diagnosis was confirmed through positive RT-PCR or positive RAT testing.

2) All the male and female post covid medical students either symptomatic or asymptomatic from both the genders.

3) Students who were willing to participate in the study and adhere to the intervention protocol.

4) No underlying medical conditions contraindicating pranayama practices.

Exclusion criteria

1) Students having history of pre -existing lung disease before the covid infection.
2) Students having history of smoking and substance abuse.
3) Students who were already performing any type of yoga and meditation before the start of study.
4) Students suffering from any other respiratory disease at the time of study.

Ethical considerations

The study received ethical clearance from the Institutional Ethics Committee (IEC) via letter no. IEC/2023/Sept/34(h) dated 25-09-2023. Written informed consent and detailed COVID medical history was obtained from all participants. Confidentiality was ensured through anonymization and secure data storage, in accordance with the Declaration of Helsinki [5].

Intervention protocol

The intervention consisted of two guided yogic breathing practices—OM chanting followed by Bhramari Pranayama—conducted daily for 30 days in a calm environment (Darbar Hall). Each session lasted 45 minutes as follows:

OM Chanting

Participants performed OM chanting for 10 minutes in a seated meditative posture (Sukhasana), followed by 20 minutes of rest. Each chant lasted about 15 seconds, with 10 seconds for the "AU" sound and 5 seconds for the "M" sound following the classical

AAUUMMM, followed by a ten second pause between chants. This practice aimed to stimulate the vagus nerve and promote parasympathetic activity [10-18].

Bhramari Pranayama

After resting, participants practiced Bhramari Pranayama for 5 minutes, followed by another 10 minutes of rest. Sitting with eyes closed, they used proper hand positioning—thumbs on ears, index fingers on eyebrows, and other fingers on the nose. Each breath cycle included a deep inhalation and a slow exhalation with a humming bee-like sound, pausing 5 seconds between cycles [10-18].

Pulmonary Function Testing

Procedure

The study was conducted after obtaining ethical clearance and informed written consent from all the students. All assessments took place in a quiet, well-ventilated, temperature-controlled room to minimize distractions and maintain consistent testing conditions. Participants were instructed to wear loose clothing and to avoid caffeine, heavy meals, or physical exertion at least two hours prior to testing.

Pulmonary function testing was performed using both student spirometer and MDT digital spirometer (SPIRO 401) under resting conditions. Participants were assessed in a relaxed, upright standing posture while breathing naturally. The parameters recorded included Tidal Volume (TV), Inspiratory Reserve Volume (IRV), Expiratory Reserve Volume (ERV), Vital Capacity (VC), Forced Vital Capacity (FVC), Forced Expiratory Volume in 1 second (FEV_1), FEV_1/FVC ratio, Inspiratory Capacity (IC), and Respiratory Rate (RR).

Standardized spirometry techniques and guidelines were followed set forth by the American Thoracic Society (ATS) and European Respiratory Society (ERS), which are internationally accepted and recognized by the World Health Organization (WHO) for lung function assessment [18-19].

Data analysis

Data were analysed using SPSS version 25 [20]. Descriptive statistics (mean ± SD) were used to summarize baseline characteristics. Paired t-tests were employed to compare pre- and post-intervention PFT parameters. A p-value < 0.05 was considered statistically significant. Graphical representations were created using bar charts for clearer visualization of parameter changes.

Results and Discussion

The results of Pre and Post-Intervention parameters have been shown in Table 1. After 30 days of OM chanting and Bhramari Pranayama practice, post-COVID medical students demonstrated statistically significant improvements in key pulmonary function parameters, including Expiratory Reserve Volume (ERV), Vital Capacity (VC), Forced Vital Capacity (FVC), and Forced Expiratory Volume in 1 second (FEV_1). Non-significant improvements were observed in Tidal Volume (TV), Inspiratory Reserve Volume (IRV), Inspiratory Capacity

(IC), and Respiratory Rate (RR). A minor but statistically significant decrease in the FEV_1/FVC ratio was noted, which remained within physiological limits.

These outcomes reinforce the growing evidence base for Pranayama as a beneficial modality in respiratory rehabilitation. Notably, the improvements in FVC and FEV_1 mirror findings by Kuppusamy et al. (2016), who reported similar gains in lung function after short-term Bhramari Pranayama in adolescents [10]. Likewise, Gupta et al. (2023) found enhanced pulmonary parameters in post-COVID adults practicing yogic breathing, further validating our focus on this population [7]. The present study advances this field by targeting young post-COVID medical students, a group uniquely exposed to both physical stress and academic demands, thus enhancing the real-world relevance of our findings.

The statistically significant increase in ERV and VC indicates improved lung compliance and expiratory muscle efficiency—outcomes consistent with studies by Patel and Pandya (2022), who observed better breath control and lung mechanics in COVID-recovered individuals using structured Pranayama [9]. Telles et al. (2017) also demonstrated that slow breathing enhances alveolar ventilation and reduces airway resistance, aligning with our physiological rationale [8].

The mild reduction in FEV_1/FVC ratio supports the hypothesis of proportional improvement in both variables, as described by Maiti and Chatterjee (2023) in similar slow-breathing interventions [6]. Talwar et al. (2021) reported a comparable pattern in asthmatic patients practicing Bhramari, reinforcing that a slight drop in the ratio does not indicate decline but rather balanced volume growth [13].

The lack of statistically significant changes in TV, IRV, and IC may be attributed to the short 30-day intervention period. Bhat et al. (2021) and Udupa et al. (2018) found that more extended durations (8–12 weeks) are typically required to elicit measurable improvements in these inspiratory parameters [11,14]. Ravinder et al. (2022) showed that a six-week Bhramari regimen improved inspiratory capacity in bronchial asthma patients, supporting the notion that longer duration yields deeper inspiratory benefits [15].

The observed (though non-significant) decline in respiratory rate suggests improved vagal tone and autonomic balance. Kumar et al. (2010) reported similar reductions in breathing rate and stress hormones after OM meditation [12]. Amaranath et al. (2021) also found decreased respiratory rate and blood pressure following OM chanting in hypertensive individuals [17], reinforcing its relaxation potential. Nivethitha et al. (2016) comprehensively reviewed the autonomic benefits of Pranayama, supporting its role in enhancing cardiorespiratory coordination and parasympathetic activation [16].

What distinguishes this study is its focus on post-COVID medical students, a population that uniquely faces combined physiological deconditioning and mental health stressors due to academic pressure and frontline exposure. Our findings offer strong justification for incorporating OM chanting and Bhramari Pranayama into post-COVID rehabilitation, especially within academic institutions. The evidence presented here not only supports previous findings but also extends them by validating these interventions in a younger, high-

stress, post-viral population, thereby reinforcing their applicability across diverse clinical and subclinical groups.

Conclusion

The present study demonstrates that a 30-day practice of OM chanting and Bhramari Pranayama significantly improves key pulmonary functions—particularly FVC, FEV_1, VC, and ERV—in post-COVID medical students. These findings support the physiological benefits of slow, rhythmic breathing in enhancing respiratory mechanics and muscle efficiency. Compared to existing literature, this study adds value by focusing on young medical students facing unique post-COVID challenges, including physical deconditioning and academic stress. The results justify the inclusion of these simple, non-pharmacological interventions in structured post-COVID rehabilitation programs, especially within educational and clinical settings where mental and respiratory health are equally essential.

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Table 1. Pre and Post-Intervention parameters with t value, p value and significance

S. No	Parameters	Pre-Intervention	Post-Intervention	t value	p value	Significance
1.	TV	474.31 ± 58.77	484.86 ± 52.93	1.393	0.165	Not significant
2.	IRV	2593.58 ± 421.92	2611.01 ± 399.27	0.313	0.754	Not significant
3.	ERV	887.16 ± 145.52	942.39 ± 121.36	2.933	0.004	Highly significant
4.	IC	3067.89 ± 455.65	3095.87 ± 432.81	0.465	0.643	Not significant
5	VC	3955.05 ± 574.57	4208.26 ± 531.36	3.378	0.0001	Highly significant
6.	FVC	3.96 ± 0.57	4.41 ± 0.53	6.036	0.0001	Highly significant
7.	FEV1	3.43 ± 0.51	3.97 ± 0.50	7.894	0.0001	Highly significant
8.	% of FEV1/FVC	86.73 ± 3.33	86.55 ± 3.67	4.593	0.0001	Highly significant

9.	RR	14.81 ± 1.09	14.60 ± 0.78	1.636	0.103	Not significant

All values are in mean ± standard deviation *N.S =p > 0.05 (not significant), **S = p < 0.05 (significant), ***H.S = p < 0.01 (highly significant). TV= Tidal Volume, IRV= Inspiratory Reserve Volume, ERV= Expiratory Reserve Volume, IC= Inspiratory Capacity, VC= Vital Capacity, FVC= Forced Vital Capacity, FEV1= Forced Expiratory Volume in one second, % = Percentage ratio, RR= Respiratory Rate.