

EFFICACY OF YOGASANA PRACTICE IN IMPROVING LUNG FUNCTION IN INDIVIDUALS WITH ALCOHOL WITHDRAWAL SYMPTOMS

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Abstract:

Background: Alcohol withdrawal syndrome is associated with impaired pulmonary host defense and measurable ventilatory impairment, yet evidence on yoga-based interventions in this population remains scarce. **Objective:** To evaluate the efficacy of selected yogasana practice on lung function in individuals experiencing alcohol withdrawal symptoms. **Methods:** Sixty participants (aged 25–40 years) with CIWA-Ar scores above 10 were recruited from three de-addiction centers in Kerala and allocated to experimental (n = 30) and control (n = 30) groups. The experimental group received 45 daily sessions of a 60-minute yogasana module comprising asanas (40 min), Anuloma viloma pranayama (10 min), and Savasana (10 min), in addition to usual care; controls received usual care alone. FVC, FEV₁, and the FEV₁/FVC ratio were measured by spirometry in accordance with ATS/ERS standards before and after the intervention. **Results:** The experimental group showed significant improvements in FVC (3.14 ± 0.22 to 3.23 ± 0.20 L), FEV₁ (2.50 ± 0.20 to 2.65 ± 0.19 L), and FEV₁/FVC ($79.42 \pm 2.12\%$ to $81.94 \pm 1.92\%$) (all $p < .001$). The control group showed no significant changes ($p = .755, .975$, and $.814$, respectively). **Conclusion:** Structured yogasana practice may improve pulmonary function during alcohol withdrawal rehabilitation; further controlled trials with larger samples and longer follow-up are warranted.

IndexTerms - Yogasana; Alcohol withdrawal syndrome; Pulmonary function; Spirometry

BACKGROUND

Alcohol withdrawal syndrome is a cluster of autonomic, cognitive, and psychomotor symptoms that emerges when chronic heavy drinking is abruptly reduced or stopped. Its clinical expression ranges from nausea, anxiety, and tremor to seizures and hallucinations in severe cases (Rajasekaran et al., 2024). Sudden withdrawal can precipitate serious complications, such as seizures and delirium tremens, which frequently require inpatient care and targeted pharmacotherapy (Rajasekaran et al., 2024). Critically, the lung is a major but often overlooked target organ in this population. Alcohol alters oropharyngeal flora and promotes colonization with resistant gram-negative organisms, while blunting the cough and gag reflexes and thereby predisposing patients to aspiration (Gupta et al., 2019). It also decreases mucociliary clearance, reduces the phagocytic function of alveolar macrophages, reduces chemokine production, blunts neutrophil chemotaxis, and lowers granulocyte and lymphocyte counts, collectively impairing pulmonary host defense (Gupta et al., 2020). Individuals with alcohol use disorder are consequently more likely to develop pneumonia, tuberculosis, respiratory syncytial virus infection, and acute respiratory distress syndrome, and alcohol-related comorbidity translates into elevated hospitalization rates, intensive care admissions, and mortality (Gandapur & Wyatt, 2025; Simet, 2015). Spirometric evidence is mixed but consistent with measurable impairment. Mild airway obstruction was observed in almost half of the patients admitted to an alcohol detoxification service. Diffusion impairment was reported in all patients examined in one study, with the observed abnormalities exceeding those attributable to cigarette smoking. Additionally, central bronchial obstruction was significantly more frequent among ethanol-dependent men than among controls, and serum acetaldehyde levels correlated negatively with FEV₁ and vital capacity (Banner, 1973; Chmiest et al., 2007). Beyond obstruction and diffusion, nutritional compromise is common in alcohol use disorder (Gupta et al., 2019) and directly depresses ventilatory capacity and respiratory muscle strength. Improving respiratory function in this population is therefore not merely an exercise-science concern but a clinically necessary objective, since it bears directly on infection risk, ventilatory reserve, functional recovery during de-addiction, and the safe toleration of physical rehabilitation.

Yogasana offers a plausible, low-cost, and non-pharmacological route to that objective because the postures are performed with coordinated breath control rather than as isolated gymnastic movements, and the benefits attributed to asanas in the traditional literature depend on effective circulation of oxygen through the body (García, 2020). Asanas

are described as stimulating the vital organs and the circulatory, respiratory, and endocrine systems, which situates them as a whole-body practice with a specific ventilatory component. Physiologically, ventilation is generated by the diaphragm and external intercostals, which are responsible for most of the pressure changes that produce inspiration. Breathing is also unique as the only physiological process that is both involuntary and voluntarily modifiable, which is precisely what makes it trainable. Reviews of yoga across clinical populations report favorable changes in lung function while acknowledging that no definitive conclusion about the true effect of yoga is yet available and that the evidence remains only partially suggestive. Controlled respiratory muscle training studies indicate that such gains can be ergogenic, plausibly through diaphragm hypertrophy, improved neural control, greater respiratory muscle economy, and attenuation of the respiratory metaboreflex (Shei, 2018).

Against this background, the existing yoga literature on alcohol dependence has focused almost entirely on psychological and consumption outcomes. Respiratory function is conspicuously absent from this outcome set, and the studies cited above were also small, short-term, and predominantly concerned with craving rather than physiological capacity. The present study therefore addresses this gap by examining whether a structured yogasana program improves lung function in individuals experiencing alcohol withdrawal symptoms, with the objective of evaluating the efficacy of selected yogasana practice on spirometric indices of pulmonary function in this population.

METHODOLOGY

Sixty participants were recruited from three randomly selected de-addiction centers in Kerala. Twenty participants from each center were selected through purposive sampling based on predetermined inclusion and exclusion criteria. Eligible participants were then allocated to the experimental and control groups using an alternating numbering order (the first eligible participant to the experimental group, the second to the control group, and so on). The experimental group received 45 sessions of the selected yoga intervention in addition to the usual care provided by the centers, whereas the control group continued to receive usual care alone, without the yoga intervention.

Inclusion Criteria

Present study included male individuals aged between 25 and 40 years who were experiencing alcohol withdrawal symptoms and obtained a score greater than 10 on the Clinical Institute Withdrawal Assessment for Alcohol Scale, Revised (CIWA-Ar), developed by Sullivan et al. (1989)

Exclusion Criteria

The study excluded individuals experiencing very mild alcohol withdrawal symptoms, those with withdrawal symptoms resulting from substances other than alcohol, and those with physical disabilities that could interfere with participation in the intervention or assessment procedures. Individuals below 25 years or above 40 years of age were also excluded. Additionally, individuals diagnosed with psychiatric disorders that could interfere with participation in the study were excluded, as determined by the study's eligibility assessment.

SPIROMETER ANALYSIS

Lung function was assessed by spirometry in accordance with standardized American Thoracic Society/European Respiratory Society guidelines. Participants were seated upright and fitted with a nose clip. Height, weight, age, and sex were recorded to calculate predicted values. Participants inhaled maximally and then exhaled forcefully and continuously through a disposable mouthpiece until no further air could be expelled; verbal encouragement was provided throughout (Levy et al., 2009). At least three acceptable maneuvers were obtained. Each was required to have a sharp start and be artifact-free, with the two highest FEV₁ and FVC measurements repeatable within 150 mL. The primary outcomes were forced vital capacity, forced expiratory volume in one second (FEV₁), and the FEV₁/FVC ratio. Results were interpreted using appropriate reference equations and lower limits of normal.

INTERVENTION

The yoga module was designed to include yogic techniques that have a greater impact on overall health in subjects with alcohol withdrawal symptoms. It included selected Asanas, Pranayamas, and the session will end with a relaxation technique. (table 1) The intervention was done every morning 7.30 am to 8.30 am

Table1: List of Yogic Practice

Name of the Practices	Approximate duration
Asanas Swastikasana, Vajrasana Supta Vajrasana Tadasana Natarajasana Trikonasana Parsvottanasana Paschimottanasana	40 minutes

Purvottanasana Vakrasana Ushtrasana Pavanamuktasana Bhujangasana Dhanurasana	
Pranayama Anulomaviloma	10 Minutes
Relaxation technique (Savasana)	10 Minutes
Total duration	60 Minuts

STATISTICAL ANALYSIS

Statistical analyses were performed using R software (version 4.6.1). Descriptive statistics, including mean and standard deviation, were calculated to summarize pre-test and post-test scores. Paired-samples t-tests were used to assess within-group changes, and independent-samples t-tests were used to compare post-test scores between the experimental and control groups. All statistical tests were two-tailed, and statistical significance was set at $p < .05$.

Table 2. Demographic and baseline characteristics of the experimental and control groups (individuals with alcohol withdrawal symptoms).

Variable	Experimental (mean $\pm$ SD)	Control (mean $\pm$ SD)
Number of subjects	n=30	n=30
Age (years)	32.17 $\pm$ 4.29	32.37 $\pm$ 4.34
Age at first use (years)	19.63 $\pm$ 1.43	19.57 $\pm$ 1.41
Duration of regular use (years)	11.87 $\pm$ 3.35	8.33 $\pm$ 2.64
Height (cm)	170.38 $\pm$ 4.97	170.33 $\pm$ 5.44
Weight (kg)	73.38 $\pm$ 9.19	73.60 $\pm$ 10.59
BMI (kg/m ²)	25.21 $\pm$ 2.33	25.23 $\pm$ 2.18
Systolic BP (mmHg)	128.69 $\pm$ 7.35	128.87 $\pm$ 8.35
Diastolic BP (mmHg)	82.41 $\pm$ 4.45	82.93 $\pm$ 4.75

SD = standard deviation; E = experimental group; C = control group; BMI = body mass index; BP = blood pressure.

RESULTS

Lung function was assessed before and after the intervention using forced vital capacity, forced expiratory volume in one second (FEV₁), and the FEV₁/FVC ratio. In the experimental group, all three measures increased significantly from pre-test to post-test: FVC rose from 3.14 $\pm$ 0.22 L to 3.23 $\pm$ 0.20 L, FEV₁ from 2.50 $\pm$ 0.20 L to 2.65 $\pm$ 0.19 L, and the FEV₁/FVC ratio from 79.42 $\pm$ 2.12% to 81.94 $\pm$ 1.92% (all $p < .001$). In contrast, the control group showed no statistically significant pre- to post-test changes in FVC ($p = .755$), FEV₁ ($p = .975$), or the FEV₁/FVC ratio ($p = .814$). Taken together, these findings showed a consistent pattern of improvement across all measured spirometric indices in the experimental group, alongside stability in the control group. The results are therefore consistent with a beneficial association between participation in the yogāsana program and pulmonary function; however, the within-group comparisons alone do not establish that changes differed significantly between groups.

Table 3. Statistical Analysis of Experimental and Control Group

Variable	Group	Pre-test Mean $\pm$ SD	Post-test Mean $\pm$ SD	p-value (two-tailed)	Significance	Cohen's dz
FVC	EG	3.14 $\pm$ 0.22	3.23 $\pm$ 0.20	0.00	Significant	1.64
FVC	CG	3.16 $\pm$ 0.21	3.16 $\pm$ 0.21	0.755	Not significant	0.06
FEV ₁	EG	2.50 $\pm$ 0.20	2.65 $\pm$ 0.19	0.00	Significant	2.12
FEV ₁	CG	2.53 $\pm$ 0.20	2.53 $\pm$ 0.19	0.975	Not significant	0.01
FEV ₁ /FVC ratio	EG	79.42 $\pm$ 2.12	81.94 $\pm$ 1.92	0.00	Significant	1.39
FEV ₁ /FVC ratio	CG	80.07 $\pm$ 2.15	80.02 $\pm$ 2.15	0.814	Not significant	0.04

Note. EG = experimental group; CG = control group; FVC = forced vital capacity; FEV₁ = forced expiratory volume in one second; SD = standard deviation. Within-group comparisons used paired-samples t-tests. Cohen's dz was calculated as $|t|/\sqrt{n}$ for paired observations ($n = 30$)

DISCUSSION

Pulmonary function is a key aspect of physiological health, and its assessment helps characterize ventilatory capacity and expiratory airflow. Among individuals experiencing alcohol withdrawal symptoms, lung function evaluation may help identify changes in respiratory performance during rehabilitation (Kolarzyk et al., 1999). This study assessed forced vital capacity, forced expiratory volume in one second (FEV₁), and the FEV₁/FVC ratio before and after a structured yogāsana intervention. The experimental group showed statistically significant improvements in all three measures, whereas the control group had no significant pre- to post-test changes. These results indicate that the intervention was associated with improved pulmonary function in the experimental group.

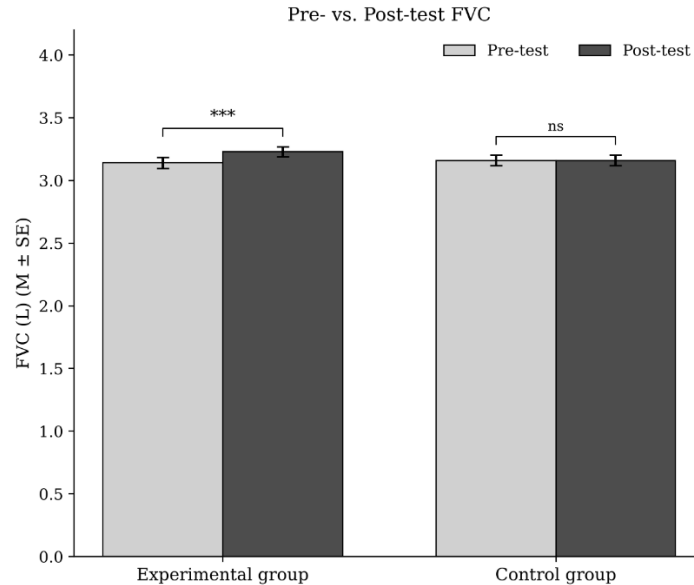


Figure 1. Pre-test and post-test forced vital capacity (FVC, litres) of the experimental (EG) and control (CG) groups.

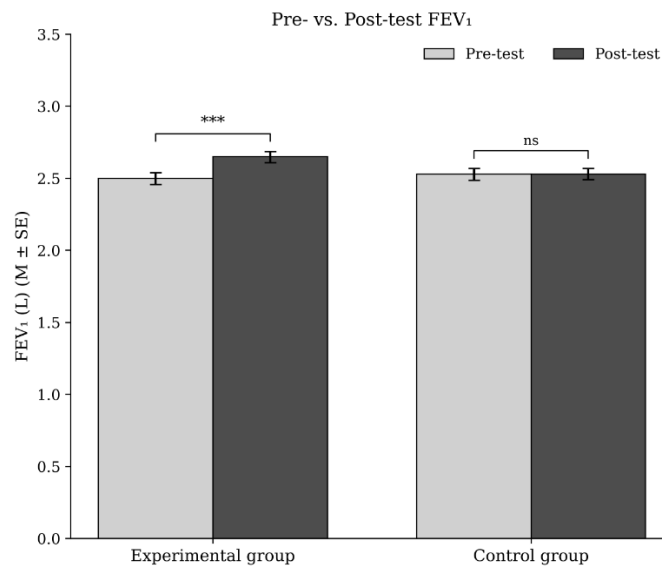


Figure 2. Pre-test and post-test forced expiratory volume in one second (FEV₁, litres) of the experimental (EG) and control (CG) groups.

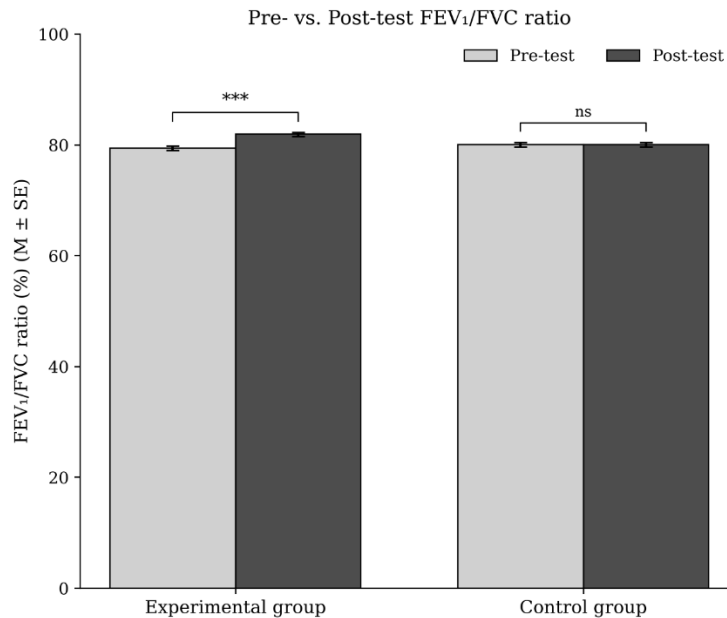


Figure 3. Pre-test and post-test FEV₁/FVC ratio (%) in the experimental and control groups

Forced vital capacity

FVC reflects the volume of air forcibly exhaled after maximal inhalation; therefore, a decrease below the lower limit of normal may indicate reduced ventilatory capacity but does not, by itself, confirm restriction, as airflow obstruction with air trapping can also lower FVC (Chhabra, 2022). In the experimental group, mean FVC increased from 3.14 ± 0.22 L at pre-test to 3.23 ± 0.20 L at post-test ($p < .001$). The increase of approximately 0.09 L indicates a statistically significant improvement in the volume of air expelled during forced expiration. In contrast, the control group's FVC changed only slightly, from 3.16 ± 0.21 L to 3.16 ± 0.21 L ($p = .755$), indicating no statistically significant change. The improvement observed in the experimental group may be associated with the physical and respiratory demands of structured yogāsana practice. Postures involving controlled trunk movement, thoracic mobility, and coordinated breathing may facilitate more effective respiratory movement and improve the performance of forced respiratory maneuvers (Rao & Pal, 2024). Furthermore, this expansion in thoracic compliance likely optimizes diaphragm efficiency, reducing the autonomic dysregulation frequently observed during the acute phase of alcohol withdrawal. These findings align with prior research demonstrating that consistent yogic intervention can significantly enhance Forced Vital Capacity and other critical respiratory health indices (Chahal et al., 2023).

Forced expiratory volume in one second

FEV₁ quantifies the volume of air forcibly exhaled during the first second of expiration and serves as an indicator of expiratory airflow. In the experimental group, mean FEV₁ increased from 2.50 ± 0.20 L at pre-test to 2.65 ± 0.19 L at post-test ($p < .001$), a rise of approximately 0.15 L. By contrast, the control group showed virtually no change, with values of 2.53 ± 0.20 L and 2.53 ± 0.19 L, respectively ($p = .975$). Thus, a statistically significant within-group increase was observed in the experimental group, but not in the control group. The observed increase may reflect improved performance during forced expiration, potentially related to respiratory muscle coordination, thoracic mobility, or more effective execution of the spirometric maneuver. However, because FEV₁ is influenced by factors such as airway caliber, lung volume, effort, and testing technique, these data do not establish a specific physiological mechanism.

The findings are broadly consistent with research reporting improvements in pulmonary function and respiratory muscle measures following yoga-based interventions, including studies involving healthy individuals (Akhani et al., 2019; Chaudhary et al., 2024; Kakkar et al., 2024). Proposed explanations include increased respiratory muscle strength and chest-wall mobility, as well as changes in autonomic activity and airway resistance (Chaudhary et al., 2024; Promsrisuk et al., 2023). These mechanisms remain tentative in the present study and cannot be confirmed solely from the observed spirometric changes. Moreover, regular yogic practice facilitates the isometric contraction and rhythmic expansion of the intercostal and abdominal muscles, which may directly augment overall respiratory muscle strength and expiratory efficiency (Fetter et al., 2021; Jahan et al., 2020).

FEV₁/FVC ratio

The FEV₁/FVC ratio represents the proportion of forced vital capacity exhaled during the first second and is used to assess airflow obstruction. In the experimental group, the ratio increased from $79.42 \pm 2.12\%$ to $81.94 \pm 1.92\%$ ($p < .001$), a rise of approximately 2.51 percentage points. By comparison, the control group showed a slight, non-significant decrease from $80.07 \pm 2.15\%$ to $80.02 \pm 2.15\%$ ($p = .814$). The increase in the experimental group indicates that FEV₁ rose proportionally more than FVC during the intervention, changing the relationship between early expiratory flow

and total forced vital capacity. However, an increase in the FEV₁/FVC ratio alone does not establish improved lung health or confirm the resolution of airflow obstruction (Uçgun et al., 2026). Interpretation should also account for predicted values, the lower limit of normal, clinical history, and individual FEV₁ and FVC measurements. Evidence on yoga's effects on the FEV₁/FVC ratio is mixed. Some meta-analyses report significant improvements following yoga-based interventions (Rathore et al., 2025), whereas other studies have found no statistically significant change (Vempati et al., 2009). Differences in findings may reflect variation in participants' baseline pulmonary health and in the duration and intensity of interventions across clinical populations (Khurde et al., 2021; Yang et al., 2016). Overall, the three parameters show a consistent pattern: the experimental group had statistically significant within-group improvements, while the control group did not. Nevertheless, evidence specifically concerning individuals experiencing alcohol withdrawal symptoms remains limited, and the present findings offer preliminary evidence in this population. Future investigations should prioritize longitudinal study designs to determine whether these physiological improvements translate into sustained enhancements in motor control and long-term abstinence success rates.

CONCLUSION

The present study found statistically significant improvements in FVC, FEV₁, and the FEV₁/FVC ratio among individuals experiencing alcohol withdrawal symptoms after a structured yogāsana intervention. By contrast, the control group showed no statistically significant changes in these measures. These results indicate that structured yogāsana practice may serve as a complementary approach to improving selected aspects of pulmonary function during alcohol withdrawal rehabilitation. Larger studies with follow-up assessments are needed to establish the clinical significance and durability of these changes.

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