IJAYUSH
International Journal of AYUSH
AYURVEDA, YOGA, UNANI, SIDDHA AND HOMEOPATHY
http://internationaljournal.org.in/journal/index.php/ijayush/
International Journal Panacea Research library
ISSN: 2349 7025

Original Research Article | Volume 10 Issue 6 | Nov-Dec 2021

EFFECT OF YOGIC PRACTICES IN THE MANAGEMENT OF CHRONIC OBSTRUCTIVE PULMONARY DISEASE (COPD): A CASE STUDY

[1]P. Geetha, *[2]Guru Deo, [3]Ishwar N. Acharya, [4]Ishwar V. Basavaraddi

[1]Naturopathy Consultant, Out Patient Department, Morarji Desai National Institute of Yoga, 68, Ashok Road, New Delhi-110001

*[2]Assistant Professor (Yoga Therapy), Department of Yoga Therapy, Morarji Desai National Institute of Yoga, New Delhi-110001

[3]Program Officer (Yoga Therapy), Morarji Desai National Institute of Yoga, 68, Ashok Road, New Delhi-110001

[4]Director, Morarji Desai National Institute of Yoga, 68, Ashok Road, New Delhi-110001

*Corresponding Author's Email ID**: gurudeoyoga15@gmail.com**

Abstract

Chronic Obstructive Pulmonary Disease (COPD) is a progressive disease of lungs which is likely to get worse, if not treated in time. It is not fully reversible and one of the major contributors of morbidity and mortality across the globe. The treatment modalities available in modern times are having a lot of side effect on human health. The usage of these modalities ensures a tendency of habit in patients to continue the same treatment even after adverse effect on the body. In the current case study, a patient was diagnosed COPD and advised to practice yoga practices (suksmavyayama, cleansing techniques, asana, breathing practices and relaxation)for a period of six months. The objective of this case was to explore the effect of three months yoga practice and follow up on lung function, exercise capacity and modified life style. His Forced Expiratory Volume(FEV_1)and other

parameters were taken in the beginning and at the end of intervention. The invention was categorized in three phases for three months. The patient was not able to practice all yoga techniques when came to therapy center. After three months the patient was able to do all yoga practices on his own. He reported that after three months the intake of medicine also reduced and he started experiencing feeling of wellbeing. All the practices were focused to make the patient breathe deeply with expanded chest. These practices were effective to give the bronchodilatory effect. Thus, in this way, an integrated approach to disease like COPD can be effectively managed and improvement in Quality of Life will be exhibited. Yoga, particularly breathing methods, can be a beneficial adjunct intervention for COPD patients. In future studies, the safety of yoga should be examined in more depth.

Key Words: - COPD, Yoga, Breathing exercise, Cleansing technique.

Introduction: -

The Global Initiative for Chronic Obstructive Lung Disease (COLD) defines COPD as "a disease state characterized by airflow limitation that is not fully reversible. The airflow limitation is usually both progressive and associated with an abnormal inflammatory response of the lungs to noxious particles or gases."(Pauwels et al., 2001)In the present scenario, COPD is considered as the third leading cause of death as a non-communicable disease across the globe including India.(Lozano et al., 2012)The global prevalence of COPD is estimated to be 12% and the prevalence is directly proportional to ageing.(Varmaghani et al., 2019) This was against the prevalence of 8.9% reported in 2006 that indicates a steady rise in the number of cases. Demographically men are more likely to get affected than females. There is a link attributed to the occupational risks associated with men.(Artyukhov et al., 2015; Loganathan et al., 2006)

The burden of COPD has increased significantly in India, Salvi et al reported that COPD cases have heightened from 28·1 in 1990 to 55·3 million in 2016.The data which was reflective in the prevalence steeped up to 4.2% in 2016 compared to 3.3% in 1990.(Salvi et al., 2018)Smoking, chronic exposure to dust, fumes and other lung irritants

are regarded as the risk factors for COPD. Pathogenesis of COPD involves an increased resistance to airflow and diminished expiratory flow rate.(Devine, 2008)COPD being a disease of slow progression has a long standing asymptomatic period followed by deterioration of lung function with persistent cough, dyspnea, wheezing and chest tightness as cardinal symptoms. In advanced stages this can progress to respiratory failure or pulmonary infection. Apart from pulmonary abnormalities, COPD also induces damage in muscles, nutritional impairment associated with weight loss.(Devine, 2008; Viegi et al., 2007)

Smoking cessation remains one of the primary management strategies along with other pharmacotherapies like bronchodilators. However reports suggests that the present day medications are insufficient to arrest the progression of COPD and therefore the management are mostly focused on symptomatic relief.(Rabe et al., 2007) Besides the challenges in treatment, absenteeism from work, poor sleep, exercise intolerance are the gaps that need to be addressed in the management of COPD.(Deepak Yaduvanshi, 2020)The popularity of Complementary and Alternative medicine (CAM) is increasing and it has been widely used by many patients as an integral part of their disease management schemes. In absence of effective strategies recent reports suggests that pulmonary rehabilitation is an effective mechanism need to be employed in the management of COPD. There are several research findings about the affectivity that yogic interventions are very much contributory to manage COPD disorders and associated symptoms like respiratory infection, shortness of breath wheezing, producing lot of mucus and cough. Yoga therapy an ancient Indian system of medicine has shown to relieve COPD related symptoms like dyspnea and improve the quality of life and lung function.(Donesky-Cuenco et al., 2009) Based upon our current case study, breathing exercise and yogic intervention are more convenient to patient and also to avoid the drawbacks of conventional method. Thus, COPD may be recommended to be treated by introduction of integrated approach of yoga therapy.

Case Report: -

In the current observation a 62 years male diagnosed with Chronic Obstructive Pulmonary disease, professionally a book-binder. He has been admitted to Rajan Babu Institute of Pulmonary Medicine & Tuberculosis, for treatment and management of his condition shortness of breath which progressively increased in severity for the past four days. The patients reported with symptoms of shortness of breath with wheeze, cough with production of mucous sputum and dyspnea occurred after an episode of upper respiratory tract infection. The patient has developed intermittent chronic cough associated with mucoid sputum for the past 3 years also persistent breathlessness for the past 1 year especially on exertion. Usually, the patient has a history of chronic smoker in last two years before, now abandoned the smoking habit. He used to take twenty sticks in day earlier and he had been diagnosed with hypertension for the past one year and is currently on T Amlodipine 5 mg medicine. He has been having intermittent chronic cough for the past three years and the cough is productive at time, the sputum produced is mucoid in nature and about one tablespoonful in amount no blood seen anytime, no foul-smelling. Now-a-days, he proceeded to have shortness of breath for the past one year and dyspnea is persistently present and described as requiring increased effort to breathe. It has worsened on exertion and experienced reduced effort tolerance. He is not able to climb even two stairs. He also developed symptoms of upper respiratory tract infection such as rhinorrhea and sore throat one week prior to admission and had fever of 38 degree celcious. He was feeling breathlessness even at rest not able to speak even sentences properly. He has not sought any yoga therapy treatment prior to this admission.

On physical examination during his treatment at hospital In-Patient Department. He was tachypneic with a respiratory rate of 28 breaths per minute. Patient diagnosed with acute exacerbation of chronic obstructive airway disease due to upper respiratory tract infection. There was no cyanosis. Respiratory system examination showed use of accessory muscles as well as increased anterior posterior diameter of the chest and reduced cricosternal distance. On auscultation, vesicular breathing was heard with generalized bronchi and coarse early inspiratory crepitations at the lower zone of both lungs. The cardiovascular

system examination was normal. There were no other abnormalities on physical examination. As per review, no loss of appetite, weight and mild ankle edema but no other signs of heart failure and paroxysmal nocturnal dyspnea.

He was given nebulization of ipratropium bromide, salbutamol and normal saline for 3 times as primary treatment in modern medicine approaches. He was discharged after one week, when the dyspnea has reduced. He was given metered dose inhaler of Ipratropium Bromide 40microgrammes tds and Metered Dose Inhaler salbutamol 200microgrammes. He was given an appointment to assess his symptoms at the outpatient department in one-month time and advised to regular follow-up at Yoga Out Patient Department for follow-up, the patient was observed during his regular Yoga practices at home (Table No.-1). In this way, after the first course the breathlessness reduced to normal without any wheezing sound, feels better to climb stairs but mucoid sputum was persisted. In general condition his Meter Dose Inhaler salbutamol was reduced at once.

The patient was advised to continue his second yoga protocol in daily practices. Details of practice are advised to him is given in (Table No.2). Second Course of the treatment was started. Following for1 month of yoga practice, specially concentrated on breathing practices, like (Chest Breathing) breath in and breath out, hand stretch breathing and pranayama to improve the oxygen level present in the air. It strengthens the bronchioles and air reaches the alveoli sac to improve the oxygen level and to eliminate the carbon dioxide. Third Course of the Treatment (Table No.3), specially taught the patient for specific asanas, which improve the respiration level from the abdominal cavity, when the deep exhalation. It separates the chest cavity to improve the air passage and it showed the signs of improvement in walking gait. After the yogic breathing techniques, asanas, pranayama there was a change in daily intake of medication. Nebulization has been stopped completely. He was feeling more comfortable in breathing after doing all the course of treatment advised during the visit of the Out Door Yoga Department. The twice-weekly yoga program included asanas (yoga postures) and pranayama along with breathing techniques. Major outcomes which were found are reduced heart rate, dyspnea, and pain improved oxygen saturation. Feasibility was measured by spirometer. Due to

yoga practices intervention others improvement are patient-reported increased feeling of wellbeing, less difficulty in breathing, improved physical and mental performance and improved quality of life (QoL).

Some of the initial measurements taken in the Yoga OPD are given below:

Table No. 1 Clinical Examination of Patient

Pulse Rate	72 beats per minute, regular with good volume, no bounding pulse
Respiratory Rate	28 Breaths per minute
Blood Pressure	140/92 mm/Hg
Temperature	38 degree Celsius
SpO2:	96%

Examination of the respiratory system:

On inspection of the hands, there was no peripheral cyanosis or flapping tremors seen. There was also no clubbing, muscle wasting or palmar erythema seen. There was presence of nicotine stains. The jugular venous pressure is mildly elevated at 3.5 cm above the sternal angle. On palpation of the trachea, the trachea is central but the cricosternal distance is 2 fingers which is reduced. The apex beat could not be palpated. On inspection of the chest, there is an increased anterior posterior diameter giving rise to a barrel shaped chest. The chest moves equally with respiration and there is use of accessory muscles with intercostal, subcostal and suprasternal retraction. There are no chest wall deformities. On palpation, chest expansion is reduced on both sides. On percussion, there is hyper resonance over both lungs with loss of liver and cardiac dullness. On auscultation vesicular breathing is heard. There is generalized Expiratory Rhonchi. There are also fine early

inspiratory crepitations heard at the lower zones of both lungs. While examination of cardiovascular system mild bilateral pitting edema can be seen.

Yogic Intervention:

The patient was admitted in Patient Department in Rajan Babu Institute of Pulmonary Medicine & Tuberculosis (RBIPMT) for seven days. In the In-patient department, he was taught initial level of yoga practice (Given in Table No. 2). After seven days, he was discharged from the hospital and advised to continue the practice for three months follow up. During the follow up, he used to visit Yoga Therapy Centre once in 15 days. During the follow up period, therapist was instructed to contact patients via phone to ask whether he has any doubt or query regarding yoga practice. In this way patient was thoroughly monitored about regularity of practice.

The following is the Yoga module recommended by the concerned therapist at Yoga OPD for patient to practice in three phases during three months with follow up.

S.NO.	Yogic Practices	Number of Round
List of Yoga Practice Given in First months		
1.	Prayer	
2.	Breathing Observation	5 Rounds
3.	Concentrate on Breathing pattern	
4.	Clavical Breathing	5 Rounds
5.	Abdominal Breathing	5 Rounds
6.	Nadishodhan Pranayama	5 Rounds
7.	Om Chanting	

List of Yoga Practice Given in Second Months		
Suksma Vyayama		
1.	Bhuja-Valli-sakthi-Vikasaka	3 Rounds
2.	Vaksha Sthala Shakti Vikasak-1	3 Rounds
3.	Vaksha Sthala Shakti Vikasak-2	3 Rounds
Chest Breathing		
4.	Hand Stretching Breathing (Chest Level, Forehead level) Hand In and Out Breathing	5 Rounds 5 Rounds
5.	Tadasana with Breathing	5 Rounds
6.	Katichakrasana with Breathing	5 Rounds
7.	Nadishodhana Pranayama	10 Rounds
List of Yoga Practice Given in Third Months		
1	Kapalabhati Jala Neti	Initially 15- 20 Strokes
2	Deep Breathing Exercise	05 Rounds
3	Chest Breathing Exercise	
4	Tadasana	5 Rounds
5	Katichakrasana	5 Rounds
6	Ardha Chakrasana	5 Rounds
7	Marjari asana	5 Rounds
8	Nadhishodhana Pranayama	10 Rounds

Therapeutic Focus and Assessment: -

Patient was advised to practice regularly these above said practices under the guidance of yoga therapist whereas shatkriya was practiced twice a week. Initially the patient was unable to do any yogasana but gradually after a week he was able to practice five rounds. The patients started showing interest in yoga practices and regularly visited the yoga department as per instructions of research officer and yoga therapist.

Follow up and Outcome

The patient's condition was assessed in every month during the active yogic treatment of three months, whereas the condition was assessed first time once in month during follow-up. Significant improvement was noted in Breathing Exercise in Forced Expiratory Volume (FEV_1) as assessed by consultant. Patient's breathing cycle was increased up to 31 breaths per minutes. Now, patient's more eager to go with yogic treatment and want to tapper the allopathic medication including nebulizer. Further, Pranayama and Deep Breathing rounds were increased up to 05 times for 01 month period and next follow-up and found that patient now can easily do deep breathing and able to concentrate on breathing. In a follow-up after completion of two months patients seeking much interest in yogasana kriya and sukshavyayama. Thereafter, patient was advised for two months of continuous practices under the guidance of therapist where by patient have to go up to seven round of the yogasana exercises. The patient was advised to continue the practice and if any obstruction that was also registered so, that while doing analysis it can be also noted. Based on the advised and instruction, observation was continuously done to explore the effect of practice. At present, patient is well managing with Yogic therapy now, which encourages for further treatment, planning and research in this disease with yogic approach. During the Practices Observation, was able to enhance the rounds of each Practice and feel less weakness in the body. The current studies shows that, to enhance the potential for breath improvement in COPD patients, timed breathing pranayama techniques were incorporated into the yoga practice. Deep breathing techniques are simple to employ because they are mild, suitable for everyday use, and simple to change based on the individual's needs. Furthermore, focusing on extended exhalation may help patients with COPD avoid air

trapping in the lungs and slow expiratory flow rates, both of which are linked to greater dyspnea. Yogic practices were taught to the patients, which included exhaling twice as long as inhaling and no inspiratory or expiratory pauses. Yogic exercises resulted in the improvement of pulmonary functions, severity of dyspnea and improve the quality of life to see the Effect of Yogic Practices in the management of Chronic Obstructive Pulmonary Disease.

Table No. 5 showing the assessment data taken during the visit of the patient inYoga Training Centre (YTC)

Sr. No.		Details of Assessment Done During Follow Up Period				
		BP	PR	RR	SpO2	FEV1
1.	First Visit	140/90	86	26	96%	40% to 49%
2.	Second Visit	138/86	80	24	98%	50% to 59%
3.	Third Visit	134/82	70	20	90%	72% to 79%
4.	Fourth Visit	126/84	76	18	92%	70% to79%
5.	Fifth Visit	134/80	72	18	90%	70% to 79%
6.	Sixth Visit	130/84	80	16	92%	76% to 79%
BP- Blood Pressure, **PR**-Pulse Rate, **RR**-Respiratory Rate,SpO2-percent saturation of Oxygen, **FEV1**-Forced Expiratory Volume1						

Clinical Characteristics of the Patient COPD:

FEV_1 findings (pre & post treatment):-

Investigation	**Pre-value**	**Post –Value**
FEV1/FVC(%)	41%	44%
FVC (L/Min)	1.61L	1.87L
FEV1(L)	**0.50L**	**0.59L**
Spirometry	Moderate to severe air flow obstruction	Mild air flow obstruction
FEV1-Forced Expiratory Volume1, **FVC**-Forced Vital Capacity,		

Discussion: -

The result of present case study showed that Yoga Practices are effective in preventing the obstruction of breath in the respiration. The Vital Parameters of the patient were found to be stable throughout the Yogic Practices for his Breathlessness. The patient used to follow active lifestyle such as 6 mins walking, deep Breathing, and Yoga practice for every morning and evening to improve the lung function. Early Research studies have approached that active lifestyle such as daily walking and yoga practices can led to improvement in the lung function and rehabilitation(Gendron et al., 2018).One Study reported that effect of yoga on COPD patient showed lung function parameters (FVC, FEV1, and PEFR) improved. Another research reported that yoga may be a useful adjunct to other conventional form of therapy for COPD(Gendron et al., 2018).In the current case study, there were significant improvements in Forced Vital Capacity and Forced Expiratory

Volume(FVC and FEV1)values were significant after 6 months of yogic training and concluded that Yoga therapy has an overall positive effect on patients with moderate-to-severe COPD(Panicker, 2019). There was improvement in the lung function parameters(S. et al., 2013). Patient had reduced congestion in the chest, became more actively involved in their own health care, more independent in performing their daily activities, increased exercise tolerance and therefore less dependent on family, friends, health professionals, and reduced visiting the OPD for Treatment. There was improvement in the psychological function of the patient with less anxiety and depression and increased feeling of hope, control and self- esteem(Aras et al., 2017).Yogic breathing is a noncompetitive, personal, inexpensive and enjoyable actively(Kaminsky et al., 2017) Slow, relaxed breathing should also enhance well-being and reduce anxiety(Aras et al., 2017). Introducing yoga therapy based exercise regimen is warranted as it not only helps in alleviating the symptoms but it also helps in combating the psychosocial issues associated with COPD.(Volpato et al., 2015)Even the clinical efficacy of yoga is studied moderately, the long term impact of yoga on COPD and the patient adherence to yoga therapy is been not explored. Therefore, this study explored the long-term impact of yoga on lung function, exercise capacity. Yogic lifestyle and its regular practices for stipulated time. Inhaled bronchodilators continue to be the mainstay of Yoga therapy in COPD, where options can be tailored to meet patients' needs with careful selection of the Respiratory Yoga Therapies and its practices used for its delivery(Gloeckl et al., 2018). Yoga therapy along with lifestyle is very effective in controlling symptoms of COPD for Prevention of Disease. Therefore, it can be concluded that Yogic Practices will play a major role in COPD mild to severe cases. Overall, an integrated approach to disease management should be considered for improving quality of life (QoL) and subsequent patient outcomes in COPD.

Conclusion: -

The above-mentioned case study shows that the symptoms of COPD can be successfully treated in accordance with the Yogic lifestyle. Apart from the above, this case helps to make the proper prognosis this study can support in further research of the treatment of COPD with the help of Yogic principles. These yogic practices are very much effective to reduce

the severity of COPD. If the invention is initiated in the beginning of the problem, it can be fully controlled. Moreover, current observation also shows that severe cases should not be restricted to medication only and need to continue yogic practices with all the cautions and precaution for the safer result and healing. Long time practice always required to get the better result in the case of COPD with comorbidity.

Acknowledgement:

The contribution and assistance given by the Yoga Therapy Centre (collaborative Centre of Morarji Desai National Institute of Yoga) Rajan Babu Institute of Pulmonary Medicine & Tuberculosis (RBIPMT) Kingsway Camp, Delhi – 110007 is acknowledged.

References:

1. Aras, Y. G., Tunç, A., Güngen, B. D., Güngen, A. C., Aydemir, Y., & Demiyürek, B. E. (2017). The effects of depression, anxiety and sleep disturbances on cognitive impairment in patients with chronic obstructive pulmonary disease. *Cognitive Neurodynamics*, *11*(6), 565–571. https://doi.org/10.1007/s11571-017-9449-x
2. Artyukhov, I. P., Arshukova, I. L., Dobretsova, E. A., Dugina, T. A., Shulmin, A. V, & Demko, I. V. (2015). Epidemiology of chronic obstructive pulmonary disease: a population-based study in Krasnoyarsk region, Russia. *International Journal of Chronic Obstructive Pulmonary Disease*, *10*, 1781.
3. Deepak Yaduvanshi. (2020). The current challenges and opportunities in the management of COPD in a resource limited setting of an Indian subcontinent. *Journal of Biomedical Sciences*, *9*(3).
4. Devine, J. F. (2008). Chronic obstructive pulmonary disease: an overview. *American Health & Drug Benefits*, *1*(7), 34–42.
5. Donesky-Cuenco, D., Nguyen, H. Q., Paul, S., & Carrieri-Kohlman, V. (2009). Yoga therapy decreases dyspnea-related distress and improves functional performance in people with chronic obstructive pulmonary disease: a pilot study. *Journal of Alternative and Complementary Medicine (New York, N.Y.)*, *15*(3), 225–234.

https://doi.org/10.1089/acm.2008.0389

6. Gendron, L. M. C., Nyberg, A., Saey, D., Maltais, F., & Lacasse, Y. (2018). Active mind-body movement therapies as an adjunct to or in comparison with pulmonary rehabilitation for people with chronic obstructive pulmonary disease. *The Cochrane Database of Systematic Reviews*, *10*. https://doi.org/10.1002/14651858.CD012290.pub2

7. Gloeckl, R., Schneeberger, T., Jarosch, I., & Kenn, K. (2018). Pulmonary Rehabilitation and Exercise Training in Chronic Obstructive Pulmonary Disease. *Deutsches Aerzteblatt Online*. https://doi.org/10.3238/arztebl.2018.0117

8. Kaminsky, D. A., Guntupalli, K. K., Lippmann, J., Burns, S. M., Brock, M. A., Skelly, J., DeSarno, M., Pecott-Grimm, H., Mohsin, A., LaRock-McMahon, C., Warren, P., Whitney, M. C., & Hanania, N. A. (2017). Effect of Yoga Breathing (Pranayama) on Exercise Tolerance in Patients with Chronic Obstructive Pulmonary Disease: A Randomized, Controlled Trial. *The Journal of Alternative and Complementary Medicine*, *23*(9), 696–704. https://doi.org/10.1089/acm.2017.0102

9. Loganathan, R. S., Stover, D. E., Shi, W., & Venkatraman, E. (2006). Prevalence of COPD in women compared to men around the time of diagnosis of primary lung cancer. *Chest*, *129*(5), 1305–1312.

10. Lozano, R., Naghavi, M., Foreman, K., Lim, S., Shibuya, K., Aboyans, V., Abraham, J., Adair, T., Aggarwal, R., & Ahn, S. Y. (2012). Global and regional mortality from 235 causes of death for 20 age groups in 1990 and 2010: a systematic analysis for the Global Burden of Disease Study 2010. *The Lancet*, *380*(9859), 2095–2128.

11. Panicker, V. (2019). Effect Of Yoga As An Adjunctive Therapy On The Respiratory Function Of Copd Patients With Mild To Severe Grades Of Severity In A Tertiary Care Centre In Kerala. *Chest*, *156*(4). https://doi.org/10.1016/j.chest.2019.08.887

12. Pauwels, R. A., Buist, A. S., Calverley, P. M., Jenkins, C. R., & Hurd, S. S. (2001). Global strategy for the diagnosis, management, and prevention of chronic obstructive pulmonary disease. NHLBI/WHO Global Initiative for Chronic Obstructive Lung

Disease (GOLD) Workshop summary. *American Journal of Respiratory and Critical Care Medicine*, *163*(5), 1256–1276. https://doi.org/10.1164/ajrccm.163.5.2101039

13. Rabe, K. F., Hurd, S., Anzueto, A., Barnes, P. J., Buist, S. A., Calverley, P., Fukuchi, Y., Jenkins, C., Rodriguez-Roisin, R., van Weel, C., & Zielinski, J. (2007). Global strategy for the diagnosis, management, and prevention of chronic obstructive pulmonary disease: GOLD executive summary. *American Journal of Respiratory and Critical Care Medicine*, *176*(6), 532–555. https://doi.org/10.1164/rccm.200703-456SO
14. S., A., R., G., G., K., S.L., Y., & A., M. (2013). Efficacy of yoga on inflammatory markers, dyspnea, and quality of life in COPD. *Chest*, *144*(4).
15. Salvi, S., Kumar, G. A., Dhaliwal, R. S., Paulson, K., Agrawal, A., Koul, P. A., Mahesh, P. A., Nair, S., Singh, V., Aggarwal, A. N., Christopher, D. J., Guleria, R., Mohan, B. V. M., Tripathi, S. K., Ghoshal, A. G., Kumar, R. V., Mehrotra, R., Shukla, D. K., Dutta, E., … Dandona, L. (2018). The burden of chronic respiratory diseases and their heterogeneity across the states of India: the Global Burden of Disease Study 1990–2016. *The Lancet Global Health*, *6*(12), e1363–e1374. https://doi.org/10.1016/S2214-109X(18)30409-1
16. Varmaghani, M., Dehghani, M., Heidari, E., Sharifi, F., Moghaddam, S. S., & Farzadfar, F. (2019). Global prevalence of chronic obstructive pulmonary disease: systematic review and meta-analysis. *East Mediterr Health J*, *25*(1), 47–57.
17. Viegi, G., Pistelli, F., Sherrill, D. L., Maio, S., Baldacci, S., & Carrozzi, L. (2007). Definition, epidemiology and natural history of COPD. *The European Respiratory Journal*, *30*(5), 993–1013. https://doi.org/10.1183/09031936.00082507
18. Volpato, E., Banfi, P., Rogers, S. M., & Pagnini, F. (2015). Relaxation techniques for people with chronic obstructive pulmonary disease: a systematic review and a meta-analysis. *Evidence-Based Complementary and Alternative Medicine*, *2015*.