EFFECT OF ANULOMA VILOMA PRANAYAMA IN PEOPLE WITH DECREASED LUNG RESERVE DUE TO COVID-19: A LITERATURE REVIEW

ABSTRACT

Objective: The main aim of this literature review was to find the effect of anuloma viloma pranayama in people with decreased lung reserve due to covid-19.

Introduction: The covid-19 pandemic lead to a public health threat. The patients frequently developed dyspnea and quickly proceed acute respiratory distress syndrome, septic shock and other complications. Continuing this led to decreased pulmonary function, decreased pulmonary muscle strength, diminished ADL and QoL.

Methodology: An electronic search of published research articles was done using google scholar, PubMed and other databases etc. and analysed to find out the effect of Anuloma Viloma pranayama in people with decreased lung reserve due to covid 19. Based on inclusion criteria, few papers were included in the literature review like randomised controlled trails, systematic literature reviews, meta-analysis and pilot study.

Result: This review examined the impact of Anuloma Viloma pranayama on the lungs through various mechanisms and found that it aids COVID-19 patients in enhancing their pulmonary reserve and improving their quality of life.

Conclusion: This study discovered that pranayama can serve as an alternative method to enhance pulmonary reserve in COVID-19 patients. Practicing pranayama can help COVID-

19 patients reduce pulmonary complications and improve overall well-being. It has no negative side effects.

Keywords: *Anuloma Viloma Pranayama (AVP) and COVID-19","AVP and Respiratory dysfunction"," AVP and decreased pulmonary reserve".*

1. INTRODUCTION

The covid-19 pandemic poses a worldwide public health threat. Almost all governments have imposed lock-down measures or stay-at-home orders to prevent it from spreading [1]. Patients frequently develop dyspnea or hypoxemia one week after beginning of symptoms and in severe instances, they quickly proceed to acute respiratory distress syndrome, septic shock, and other complications. According to an elderly research, individuals with severe pneumonia have a death rate of up to 61.5% due to lack of medical research [2]. Many survivors of corona virus disease-2019 (COVID-19) have continuing symptoms, pulmonary function impairment, diminished muscular strength, activity limitation, anxiety, depression and neurocognitive dysfunction and poor quality of life. It's possible that the problems will last at least six months. This emphasises the need of providing rehabilitation programs that can help patients and the health care system to cope [3]. In the elderly, community acquired pneumonia has been linked to impaired activities of daily living (ADL) and quality of life (QoL) as well as diminished

physical and mental performance. Apraxia syndrome and pulmonary infections can be caused by respiratory illness and a lack of activity in the elderly [4].

Yoga is an Indian set of practices with ancient origins. It is characterised as *Chitta Vritti Nirodhah*, or the halting of minds whirlwind, which is best understood in modern English as a method for mental calmness [5]. In the western world, the term yoga refers to a variety of disciplines such as physical postures (*asanas*), breathing methods (*pranayama*), meditation or mindfulness and relaxation [6]. Many pulmonary rehabilitation programs now include yoga as a part of the recommended activity [7]. Patanjali's yoga sutra divided the practise of yoga into eight parts *yama* (conduct), *niyama* (self-purification), *asana* (physical postures), *pranayama* (breathing methods), *pratyahara* (sensual control), *dharana* (single-painted focus), *dhyana* (meditation) and *samadhi* (liberation) [8].

Prana is a Sanskrit word that signifies "breath", "respiration", or "life force". Stretching to expand or control is referred to as *ayama*. As a result, *pranayama* refers to the holding and prolonging of breath [9]. *Pranayama* (breathing control) is a slow, rhythmic breathing practice [10]. There are three levels of pranayama, it comprises of lengthy, delicate flow of inhaling (*puraka*), exhalation (*rechaka*), and breath retention (*kumbaka*) [9]. Pranayama is a physical activity as well as a sort of meditation that works with the mind and respiratory organs [8]. The term "pranayama" refers to a set of breathing exercise that includes *anuloma villoma* (alternate nostril breathing) [11]. As a result, for elderly patients who suffered from COVID-19 and discharged with satisfactory result, improved respiratory function is an important factor in maintaining ADL and QoL [4]. Therefore, the present study aims to perform a literary review done about the effect of *anuloma viloma pranayama* in people with diminished pulmonary reserve owing to COVID-19.

2. METHODOLOGY

A systemic literature was conducted on electronic data base of google scholar, PubMed, science direct using the terms “Anuloma Viloma Pranayama (AVP) and COVID-19","AVP and Respiratory dysfunction"," AVP and decreased pulmonary reserve". as key words. Results were filtered by the clinical trials.

2.1 Inclusion Criteria

- Patient diagnosed with COVID – 19.
- Both male and female were included
- All the age group
- Any studies of yoga intervention that measured pulmonary pulmonary reserve as primary dependent variable.
- Studies that include mechanism between pranayama and pulmonary reserve.
- All RCT using pranayama as a respiratory dysfunction treatment.

2.2 Exclusion Criteria

The studies were excluded in the narrative review if they were:

- Not based on the study.
- Abstracts and unpublished articles.

Table 1 : SUMMARY OF LITERATURE REVIEW

Author and year	Study design	Methodology	Result	Conclusion
1. Rakesh Sarwal, Rajinder K.	Randomised clinical experiment	A total of 280 HCPs were recruited and assigned to	The intervention and control groups had comparable	The study concluded that Pranayama could be an effective preventive measure

Dhamija (2021)		intervention and control groups. The intervention group practiced specially designed Pranayama modules twice daily for 28 days under the online supervision of Yoga instructors. The control group continued their normal daily routine without Pranayama sessions.	demographics and baseline characteristics. The study found a significant reduction in COVID-19 infection among the intervention group compared to the control group.	against COVID-19 infection among healthcare professionals. The practice of Pranayama was associated with a lower incidence of COVID-19 infection and improved immune function.
2. Kai Liu, Weitong Zhang, Yadong Yang (2020)	Randomised controlled trial	The trial involved 72 elderly patients with COVID-19. Participants were randomly assigned to either the intervention group or the control group. The intervention group underwent a 6-week respiratory	After 6 weeks, the intervention group showed significant improvements in pulmonary function (FEV1, FVC, FEV1/FVC%, DLCO%), 6-minute walk distance, and quality of life compared to the control group. The	The study concluded that a respiratory rehabilitation program significantly improves respiratory function, mobility, quality of life, and psychological well-being in elderly patients with COVID-19. The findings suggest that such programs should be considered as part

		rehabilitation program, which included breathing exercises, physical training, and psychological support. The control group received standard care without the rehabilitation program.	intervention group also reported better psychological well-being and reduced anxiety levels.	of the standard care for elderly COVID-19 patients.
3. Rajashree Ranjita, Alex Hankey, H.R. Nagendra (2016)	Randomized, waitlist-controlled, single-blind clinical trial.	Eighty-one coal miners aged 36-60 years with stable Stages II and III chronic obstructive pulmonary disease (COPD) were recruited. The yoga group received an Integrated Approach of Yoga Therapy (IAYT) module for COPD, which included asanas,	The yoga group experienced statistically significant reductions in dyspnea and fatigue scores, as well as improvements in SpO2% and 6-minute walk distance compared to the control group. The findings indicate that the Integrated Approach of Yoga Therapy benefits coal miners with COPD by reducing dyspnea,	The findings indicate that the Integrated Approach of Yoga Therapy benefits coal miners with COPD by reducing dyspnea, fatigue, and pulse rate, and improving functional performance and peripheral capillary oxygen saturation. Yoga can now be included as an adjunct to conventional therapy for pulmonary rehabilitation programs for COPD patients.

		loosening exercises, breathing practices, pranayama, cyclic meditation, yogic counseling, and lectures. The intervention was conducted for 90 minutes per day, 6 days a week, for 12 weeks.	fatigue, and pulse rate, and improving functional performance and peripheral capillary oxygen saturation.	

3. FINDINGS

This literary review aimed to summarize the effect of Anuloma Viloma pranayama in people with diminished pulmonary reserve owing to COVID 19. It's worth noting that no previous research has focused solely on anuloma viloma pranayama in COVID-19 patients. Due to the outbreak of covid-19, the Chinese city of Wuhan has become the centre of global interest. Pranayama may have a preventive impact by keeping the upper respiratory tract healthy and so preventing the SARS-CoV-2 virus from entering the body. Every component of the intervention module is anticipated to have a key role in infection reduction [1,2].

In contrast to COPD, Covid-19 does not always imply lasting damage to the lung's architecture, and the patients in research from both groups appear to have improved spontaneously in terms of lung function parameters [3].

Following current therapy and discharge regimens, individuals with covid-19 may have some persistent fibrotic lesions in the lungs, which may compromise the patient's respiratory function. However, following 6 weeks of respiratory rehabilitation training, the study discovered that pulmonary function had dramatically improved. The explanation for this might be that rehabilitation exercise for respiratory muscles includes intercostal muscles, enthusiastic muscles, abdominal wall muscles, and other muscles that are vital in maintaining respiratory function [4].

Previous research has found that practicing the Anuloma viloma pranayama for three months lowered anxiety levels. In fact, the preponderance of parasympathetic activity seen following a yoga breathing instruction was connected with stress reduction [5].

Improvements in dyspnea perception may be due to yogic training's reduction of sympathetic reactivity, which promotes bronchodilation by correcting aberrant breathing patterns and lowering muscular tension in the inspiratory and expiratory muscles. Improved breathing patterns may enlarge bronchioles, allowing more alveoli to be perfused effectively. Pranayama stretches lung tissues, relieving dyspnea by reducing dynamic hyperinflation of the rib cage and improving gas exchange, as well as improving respiratory muscle strength and endurance and optimising thoraco-abdominal patterns of motion [7].

Any increase in the quantity of yoga breathing practise was related with better symptom and QoL ratings, according to the yoga breathing dosage effect [8].

Patients who practised Pranayama in conjunction with radiation therapy reported feeling less worried, anxious, and frustrated [9].

Sukha pranayama is a steady, rhythmical breathing technique that is said to promote baro-reflex sensitivity while decreasing chemical reflex activity. It also lowers systolic and diastolic blood pressures, as well as heart rate, in hypertensive individuals [10].

Because of the related lymphopenia and the enhanced inflammatory response associated with increased renin-angiotensin system (RAS) activation in various organs, diabetics are more vulnerable to infection [12].

Hypertension, diabetes, CVD, COPD, CKD, and cancer were linked to an increased risk of having severe COVID-19, and CVD, COPD, CKD, cerebrovascular disease, and cancer were linked to an increased risk of mortality in COVID-19 patients, according to this systematic review and meta-analysis [13]. It is proposed that the effect of SARS-CoV-2 on blood glucose, which may be connected to ACE2, be evaluated in order to justify the high incidence of diabetes in fatal patients. Shortness of breath and cough are two symptoms common in asthma patients, and they are also common in COVID-19 instances. According to the present findings of this meta-analysis, 8% of patients with COPD comorbidities are more likely to experience fast disease progression than those who do not have COPD [14].

However, it should be highlighted that meta-regression has limits when it comes to investigating the relationship between variables, necessitating the use of bigger cohorts. Aside from the indirect link, the existence of brain medullary cardiorespiratory or autonomic nervous system dysfunction might theoretically induce blood pressure and respiratory problems, increasing the risk of getting opportunistic infections (viral and bacterial). In post-stroke patients, the cholinergic system decreases pulmonary innate immunity, increasing the risk of bacterial pneumonia. A significant majority of the publications included in this systematic review and meta-analysis were pre-prints, which is a restriction. The majority of the research were retrospective in nature and originated in China [15].

Increased D-dimer levels in these individuals reflect a continuous inflammatory and hypercoagulable condition, and they are a poor prognostic indicator linked to a high death rate [17].

Respiratory epithelial cells are infected early in viral infection, therefore epithelial alterations predominate with indications of viral activity. In individuals with severe illness and/or underlying risk factors, subsequent viral clearance is reduced. Even in later stages of COVID-19, epithelial lung damage with hyperplasia and atypia of pneumocytes, as well as multinucleation, perhaps indicating viral cytopathic effects, supports this observation. Multiple variables can contribute to the development from low to high elastance, including the patient's self-inflicted lung injury and ventilator-induced lung injury. Clinical data, such as test results, radiographic findings, and therapy details, were not routinely documented and so were not accessible for all instances [18].

The reduced diffusion capacity might be explained by pathological alterations in the lungs. We discovered a significant prevalence of impaired diffusion capacity (66%) in severe patients, particularly those with high inflammatory markers, who are more prone to develop pulmonary fibrosis. The considerable variability of the included studies, particularly across the different assessments utilised, is the study's most significant weakness. The criteria for diagnosing the severity of pneumonia vary depending on the literature; examples include CT results, COVID-19 standards, and the utilisation of ventilatory assistance [19].

The course of Coronavirus sickness 2019 appears to be gentler in children than in adults, which begs the question: why? A number of recommendations have been made. Virus infections are common in children, especially younger children. It's likely that recurrent viral exposure helps the immune system respond to SARS-CoV-2 more effectively. The reduced frequency of

severe COVID-19 in paediatric patients is unlikely to be due to a lack of smoking in children. In adults, smoking does not appear to play a significant role in the aetiology of COVID-19[20].

Dyspnea patients were more likely to die, according to our findings. Dyspnea is a symptom of hypoxia and reduced lung function. As a result, professionals must be on the lookout for dyspnea symptoms in order to avoid the illness from worsening [21].

When the breathing interval is increased, respiratory-related vagal modulation occurs. Low breathing rates can boost high-frequency amplitude while lowering low-frequency amplitude. HRV measurements without modifying the LF:HF ratio R-R interval or blood pressure is the average R-R interval. Breathing slowly is beneficial. Improvements in baroreceptor sensitivity are linked to this. Increased hypercapnic chemosensitivity, and reduced hypercapnic chemosensitivity Srivastav, according to et al., lung expansion triggers a reflex reaction. Stretch receptors increase vasodilation in the body. skeletal muscles and reduce systemic vascular resistance. Resistance and blood pressure are two factors to consider. According to Bharadwaj et al. respiratory tract mucociliary beats increased rhinosinusitis sufferers' epithelium after practising ANB, as well as the suggested ANB, improves systemic oxygenation and the amount of surface area available for oxygen absrption[22].

Joshi et al. found that 6 weeks of only pranayama training enhances ventilatory functions in healthy people, as measured by increases in FVC, FEV1, MVV, and PEFR. In healthy volunteers, Sivakumar et al. investigated the acute effect of deep breathing (2-10 min) and found that the PFT values improved. Yoga, according to Yadav and Das, improves PFT values by increasing respiratory muscle strength, eliminating respiratory secretions, and filling the breathing apparatus more effectively and fully by activating the diaphragmatic and abdominal muscles. Furthermore, training in Nadisodhana pranayama may enhance PFT values by increasing thoracic - pulmonary compliances and broncho dilation. Stretching of the lungs is

stimulated. Inflation of the lung stimulates pulmonary stretch receptors, which relaxes the smooth muscles of the larynx and tracheobronchial tree reflexively. This most likely decreases airway resistance by modulating the airway diameter [23].

The effectiveness of unilateral nostril breathing has been studied in clinical trials. Friedell published the first clinical trial of alternating nasal breathing for rhinitis and sinusitis symptoms on 38 patients in 1948. It was discovered that alternating nasal breathing has a significant impact on the relief of rhinosinusitis symptoms, and that it can even reduce the need of steroidal nasal sprays. AVP, as a modified form of nasal breathing, significantly improves ciliary oxygenation by increasing ciliary surface O2 availability, as well as augmenting the generation of NO, which has been shown to improve mucociliary function. Humming, which is also a type of breathing technique like AVP, has been scientifically confirmed to boost NO levels in the nasal cavity. By boosting both surface and systemic oxygen concentration levels, AVP can surely increase surface availability of oxygen and aid in more than one manner to meet the ciliary requirement for oxygenation [24].

In COPD patients, pranayama can be used as an adjunct therapy as well as a rehabilitation tool. This method is a strategically constructed motion that requires minimum effort after the practitioner has become accustomed to it, and it is completely free. Pranayama allows nonfunctioning or blocked airways to operate again. It encourages belly breathing and relieves the diaphragm, the major muscle of respiration. This abdominal breathing increases not just respiratory and oxygenation, but also circulation. Clearing the airways with deep and slow breathing aids in the fight against secretions by allowing the diseased airways to evacuate secretions via ciliary activity, reducing inflammation of the respiratory passages [25].

Some researchers have demonstrated that it has a positive effect on the effects of yogic yoga on lung function parameters in our case, only in the research did there appear to be a meaningful

improvement. Improvements in FVC and FEV1 levels as a result of PEFR. After 3 months of yogic instruction, they were minimal. There was a case report of this happening. Pneumothorax caused by Kapalabhati practise pranayama, but this did not happen in our case study [26].

4. LIMITATIONS

The purpose of this research was to conduct a literature review on the practise of anuloma viloma pranayama on Covid-19 patients. Individuals can undertake systemic review and meta-analysis by practising anuloma viloma pranayama on patients with covid-19, while others can practise Bhastrika, Kapalbhati pranayama on a regular basis, according to the findings of the current study.

5. CONCLUSION

Corona virus is the most contagious virus that attacks the lungs, causing many deaths across the world. The benefit of practising anuloma viloma pranayama on lowering respiratory difficulties in covid-19 patients, such as decreased respiratory reserve, decreased lung capacity, tiredness, dyspnea, chest discomfort, anxiety, and so on, was discovered in the study. Pranayama practise on a daily basis maintains the body healthy and the lungs functioning correctly.

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