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Case Report

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Successful clinical application of Ayurveda in Intensive care unit for avoiding need of mechanical ventilation in a patient of Acute Respiratory Disease Syndrome (ARDS)

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ABSTRACT

There exist controversies among medical practitioners regarding the use of mechanical ventilation in the management of Acute Respiratory Disease Syndrome (ARDS). There is a piece of emerging evidence that indicates that irrational use of ventilators can actually harm patients and increase mortality rates. As such, there is a great unmet need to reduce the risk of the requirement of mechanical ventilators. This creates a scope for integrating modern therapies with traditional systems to fulfill this unmet need. However, there is a paucity of evidence about the use of integrative therapies, especially in intensive care settings. Here we present a case of a hypertensive 60 years male patient of coronavirus disease who developed ARDS. This patient has developed a gradual worsening hypoxia which does not respond to O2 supplementation and intravenous glucocorticoid therapy in the first wave of COVID-19. As such it has been planned to put the patient on the mechanical ventilator. However, as the patient and his relatives have not consented to intubation and the use of mechanical ventilation, it has created a scope for introducing some complementary therapy that can help in improving outcomes and prevent the requirement of the mechanical ventilator. After starting Ayurveda therapy, there has been a gradual improvement in partial pressure of oxygen levels which has become normal within a week of starting Ayurveda treatment.

Keywords: Mechanical ventilator, Glyc*yrrhiza glabra, Zingiber officinale, Adhatoda vasica, Adhatoda vasica*, Respiratory illness.

INTRODUCTION

Acute Respiratory Disease Syndrome (ARDS) is defined by an immediate and diffuse inflammatory injury to the alveolarcapillary barrier, which is accompanied by an increase in vascular permeability and decreased compliance, limiting gas exchange and generating hypoxemia. This syndrome is described histopathologically as widespread alveolar injury, which comprises irreversible damage to the alveolar epithelial cells and capillary endothelial cells, with subsequent formation of a hyaline membrane, followed by intracapillary thrombosis. All of these mechanisms are linked to COVID-19 and involve the phenotypic expression of several proteins whose transcription is controlled by viral infection [1].

ARDS is primarily caused by pneumonia, thus it's important to correctly identify the source of the infection or pathogens causing the illness. The most common direct injury resulting in acute respiratory distress syndrome (ARDS) is community-acquired bacterial pneumonia. Viruses were considered to be the cause of 5–10% of community-acquired pneumonia (CAP) cases, particularly influenza being the most common virus. Herpesviruses are becoming a more widely acknowledged cause of ARDS in addition to common respiratory viruses [2].

Mechanical ventilation is a life-saving intervention for patients with ARDS, including those with severe COVID-19. However, it comes with its set of complications. Mechanical ventilation is a crucial supportive measure for patients experiencing acute respiratory failure due to pulmonary or systemic insults. Its primary function is to facilitate gas exchange and reduce the workload on respiratory muscles. While mechanical ventilation is not a direct treatment for respiratory failure, its management requires close attention, as inappropriate ventilation can lead to lung or respiratory muscle injuries and worsen patient outcomes [3]. Many COVID-19 patients placed on mechanical ventilators do not survive, and those who do often experience long-term respiratory problems [4]. Some of these issues may be caused by the use of the ventilator itself or by the damage inflicted by the virus on the lungs. This emphasizes the urgent need for effective management of hypoxia and the prevention of patients from progressing to a state of respiratory distress that necessitates mechanical ventilation.

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ARDS is a complex and severe condition that requires meticulous and specialized care. As more research is conducted and clinical experience with COVID-19 grows, healthcare practitioners have been able to develop better treatment strategies to tackle ARDS effectively [5]. By implementing evidence-based interventions, including early use of supplemental oxygen, prone positioning, and non-invasive ventilation techniques, healthcare providers can potentially mitigate the need for mechanical ventilation and improve patient outcomes [6].

The most important unmet need in the management of ARDS lies in the treatment of patients with COVID-19 and in those who need intensive care. The major burden of mortality in coronavirus disease lies in those patients who need intensive care, especially mechanical ventilation. There is a paucity of literature or evidence regarding the scope of integrating traditional medicine along with the standard of care in improving therapeutic outcomes in patients with ARDS associated with severe coronavirus disease. We, hereby, report the outcomes of a case of 60 years old male hypertensive patient with severe coronavirus disease who has been suffering from severe hypoxia. This patient is treated with an integrative approach combining Ayurveda medicine with conventional intensive care.

CASE REPORT

A 60-year-old Indian male, with a past medical history of hypertension for 9 years, was presented to a private medical institution in Pune. He had symptoms of influenza like illness for the past 3 days. This patient initially developed a sore throat and sneezing which progressed to fever with a dry cough in a couple of days. He was admitted to the isolation ward and later tested positive for COVID-19. He was treated with IV methyl prednisolone, O_2 supplementation by nasal cannula, and other symptomatic and supportive care. On around the fifth day, after developing the symptoms, the condition of the patient started worsening. His partial pressure of oxygen (PO_2) was continuously depleting. On day 5, he became severely hypoxic with his PO_2 levels of 30 mm/hg (Figure 1). Also, his D-Dimer was 5038.4 ng/mL and his X-ray chest showed bilateral lower zone infiltrates. Considering the severity of hypoxia and other parameters, the intensivist decided to intubate the patient for shift him to mechanical ventilation.

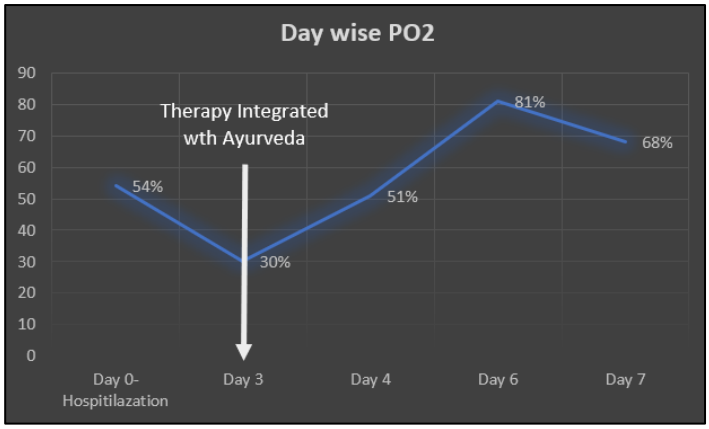

Figure 1: Day wise PO_2 levels in the patient

However, the patient's relatives did not consent to start mechanical ventilation. They decided to initiate Ayurveda therapy along with conventional care. Hence, the patient's relatives approached our Ayurveda clinic, and an Ayurveda treatment plan was designed for the patient (Table 1). After the consent of the intensivist, our team of doctors initiated the therapy and kept a daily follow-up of the patient. Ayurveda medicine was administered to the patient as an add-on therapy along with conventional care.

Table 1: Ayurveda therapy administered to the patient

S. No.	Name of the formulation	Botanical /Conventional name	Dose
1	**Mahalakshmivilas rasa**	Classical Ayurveda medicine	125 mg twice daily with honey
2	**Yashada Rasayana** Each capsule contains Jasada bhasma 20 mg Rasayana Churna Ghana 100mg	Proprietary Medicine	1 capsule twice daily
3	**Capsule Pranvir**	Proprietary Medicine	Two capsules thrice daily with warm water
	Each capsule contains following		
	Chitrak	*Plumbago zeylanica*	10 mg
	Kutaki	*Picrorrhiza kurroa*	50 mg
	Triphalaguggulkalpa	-Classical Ayu Med	50mg
	Shuddha Shilajit	Asphaltum	15mg
	Kamadudha rasa	- Classical Ayu Med	60 mg
	Shwas kuthar rasa	- Classical Ayu Med	96 mg
	Sutshekhar rasa	- Classical Ayu Med	31.5 mg
	Sitopaladi churna	- Classical Ayu Med	62.5 mg
	Yashtimadhu	*Glycerrhiza glabra*	62.5 mg
	Kantakari	*Solanum xanthocarpum*	62.5 mg

RESULTS

After starting Ayurveda treatment, the patient has started showing improvement in PO_2 and also showing improvement in symptoms like fever, throat pain, and cough. Gradually after 3 days of starting Ayurveda medicines, the PO_2 of the patients has reached 81%. In the meanwhile, therapy with methylprednisolone and O_2 supplementation has been continued for the patient. Six days after starting Ayurveda treatment (i.e. on 9th days of hospitalisation), the patient's PO_2 levels have reached 95%. The patient is discharged on day 12 of hospitalisation, during which his PO_2 is 92% without oxygen supplementation. At the time of discharge, the patient had been afebrile and had a dry cough and fatigue. Radiographic assessment resolution of chest radiograph abnormalities is shown in Figure 2.

During the entire period of 9 days of Ayurveda therapy in the hospital, a patient has shown good tolerability towards the integrated approach and favourable outcomes.

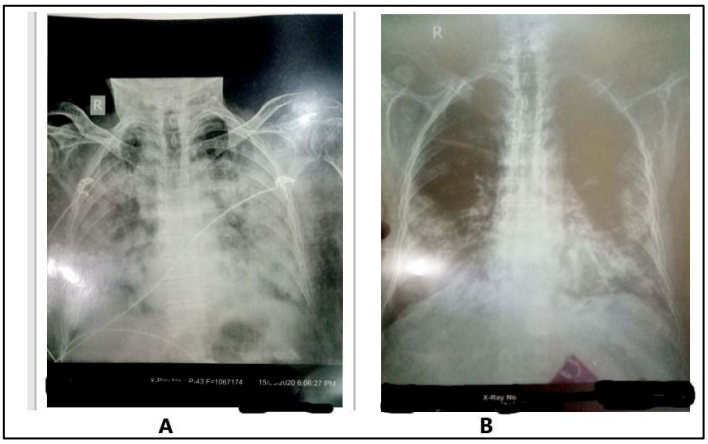

Figure 2: Comparative radiographs. **A:** X ray chest on day 3 of hospitalisation. **B**: X ray chest on day 10 of hospitalisation

DISCUSSION

Acute respiratory distress syndrome (ARDS), a potentially fatal form of respiratory failure, is a common complication of COVID-19. The severity of ARDS is graded as mild, moderate, or severe based on the degree of hypoxia. Patients with moderate-to-severe ARDS require invasive mechanical ventilation (IMV), and their prognosis is poor. The prevalence of ARDS, particularly moderate-to-severe ARDS, in COVID-19 patients, is currently unknown [7].

Patients with ARDS face hemodynamic problems as a result of both the underlying lung disease and mechanical ventilation. In reaction to inflammation, hypoxemia, and acidosis, acute lung injury reduces the functioning of the vascular bed, increases lung vascular permeability, and promotes vascular constriction [8]. Initial mechanical ventilation procedures for treating ARDS resulted in ventilator-induced lung damage. Injurious ventilation and later unduly careful weaning practices were both caused by poor technology and understanding of ARDS and other features of critical disease [9].

Our case offers insight into the potential of Ayurveda as an integrated therapy in the management of severe ARDS. As mentioned above, there is evidence that shows the use of mechanical ventilation is related to poor outcomes and increased mortality [10]. Hence it is very important to reserve the option of using mechanical ventilation until the last possible moment when it is truly a life-or-death decision. In such cases, it is very important to use therapies that can help to reduce the use of mechanical ventilators in patients. There is a great unmet need in this segment and there is a scope for the integration of conventional intensive care therapies with traditional therapies. The outcomes that are mentioned in the above case report clearly indicate the temporal relationship between initiating Ayurveda therapies and improvement in PO_2 levels. This is a strong indicator that Ayurveda therapies would have played an important role in obtaining these therapeutic outcomes.

The Ayurveda therapies used in this patient mainly consist of herbs that have shown potent antiviral, immunomodulatory, antioxidant, and anti-inflammatory properties which offer protection to vital organs. *Glycyrrhiza glabra* stimulates macrophages and, in turn, elevates and assists immune stimulation, inhibits virus growth, and stops the virus replication in the influenza virus. *Zingiber officinale* possesses potent antibacterial properties, and increases levels of antioxidant enzymes, including superoxide dismutase and glutathione peroxidase, which may be beneficial in inflammatory reactions triggered by viral infections. TNF-α is reported as an anti-influenza cytokine, and is known to be present in *Zingiber officinale* [11]. *Adhatoda vasica* is a well-known herb in Ayurveda and is used in the treatment of various respiratory illnesses. It exerts a bronchodilator effect, relaxation of tracheal muscle, and has antioxidant properties. Besides this, it also has an anti-influenza virus activity that can inhibit viral attachment and/or viral replication [12]. *Solanum xanthocarpum* has benefits in treating chronic respiratory inflammation-related diseases illnesses (pulmonary, rhinitis, hay fever, asthma, and more) Malignancy, edema, and numerous other degenerative diseases and immune system disorders [13]. *Plumbago zeylanica* (Ceylon leadwort) demonstrated immunomodulatory properties and is used as an immunomodulatory agent against many infectious diseases [14]. *Picrorrhiza kurroa* has been used in the treatment of respiratory diseases, asthma, inflammatory conditions, allergies and, liver diseases [15].

The outcomes mentioned in this case report generate initial evidence of the probable potential of Ayurveda as a complementary therapy along with conventional therapies in improving outcomes in severely ill patients of ARDS. As this therapy was seen to be well tolerated by the patient, we believe that it becomes prudent to integrate Ayurveda in the management of patients with severe coronavirus disease. This patient has been in severe hypoxic condition and considering the high D-Dimer levels he has been at high risk of developing cardiovascular accident or multiorgan failure. Considering the hypertensive comorbidity in this patient, the risk for poor outcomes has been more elevated in this patient. Therefore, it became possible to use Ayurveda therapy in this patient, because he did not give the consent for use of mechanical ventilation.

CONCLUSION

Our experience with the use of Ayurveda as a complimentary approach in the management of ARDS offers insight into the possibility of integrative therapy in optimising therapeutic outcomes. The use of Ayurveda without any overt side effects in our patient supports the need for controlled clinical trials in the management of ARDS in COVID-

19. In addition, this case highlights possible areas for integration in intensive care patients of coronavirus disease.

Conflict of interest

There is no conflict of interest.

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