

Outcomes of Ayurvedic treatment in an oxygen dependent diabetic and hypertensive COVID-19 patient in the post-hospitalization period - A Case Report

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ABSTRACT

Introduction: Low oxygen saturation may persist in COVID-19 patients even after hospital discharge, requiring continued supplemental oxygen therapy at home. In this paper, we report the significant benefits of add on Ayurvedic intervention as observed in an oxygen dependent COVID-19 patient in the post hospitalization period.

Main symptoms and/or important clinical findings: A 75-year-old gentleman approached his Ayurvedic general practitioner with complaints of low oxygen saturation and oxygen dependency five days after being discharged from hospital, where he was treated for COVID-19 related bilateral pneumonitis and Acute Respiratory Distress Syndrome as well as Acute Renal Failure. Patient reported breathing difficulty, generalized weakness, reduced appetite and severe constipation. Pulse Oximetry readings were fluctuating between 82 and 85% even with home oxygen support. Blood pressure was found to be 150/100 mm Hg, LDH slightly raised at 463 IU/L and HbA1c at 8.7 % indicated poor control of diabetes. The patient was administered micro-doses of a combination of Ayurvedic formulations sublingually every ten minutes for one day. This was followed by administration of *Indukāntam Ghṛtam* and *Suvarṇamālinī Vasanta Rasa*, Oxygen saturation improved to 95% in about twelve hours. He was weaned off oxygen support on the third day of starting Ayurvedic treatment, which was three weeks earlier than prescribed at the time of discharge from the hospital. Patient is ambulant and maintaining oxygen saturation levels between 95-98%.

Conclusion: This case report highlights the potential of a specific Ayurvedic intervention for better management of hypoxia persisting in the post hospitalization phase of patients managed with conventional medicine for COVID-19 related complications. Well-designed studies are warranted to confirm the benefits and explore the possibility of integrating such interventions appropriately with standard of care for management of COVID-19.

1. Introduction

In the beginning of May 2021, the COVID 19 pandemic is escalating in India with single day infections touching the highest ever numbers recorded globally since the outbreak in late 2019. The health care system in India has been unimaginably overwhelmed and inadequate medical care is also contributing to mortality associated with COVID-19. Patients with dropping oxygen saturation levels and breathing distress are unable to get oxygen supplementation in time or beds with oxygen support in hospitals^{1,2} It has been estimated that the second wave of the pandemic will peak in India around middle of May with daily counts exceeding 0.4 million further challenging the public health response system³. Exact numbers of deaths attributable to oxygen shortage are not yet available, but oxygen crisis has been the hallmark of the second wave of COVID-19 in India. In severe COVID-19, Acute Respiratory Distress Syndrome (ARDS) with pneumonia presents as a medical emergency requiring intensive care in hospital settings⁴. In critical stages, the immediate cause of death in most of the cases is respiratory failure, which happens due to diffuse alveolar damage⁵. A sudden surge of positive cases can overburden the health care system and deny patients access to hospital beds and oxygen in critical stages of illnesses. Harnessing the resources in India's pluralistic health care system is one amongst the possible strategies to address unmet needs at the peak of the pandemic crisis. COVID 19 patients in India have been approaching Ayurveda physicians for medical care in badly affected cities like Mumbai when left without options to access mainstream health care facilities. Such clinical encounters have unraveled the potential of Ayurvedic interventions in management of low oxygen saturation levels in COVID-19 patients. We report the case of a hypertensive and insulin dependent diabetic COVID-19 patient who was prescribed supplemental oxygen for 30 days after discharge from the hospital. The patient was able to stop oxygen therapy on the third day of administration of Ayurvedic treatment. This case report highlights the relevance and scope of integrating Ayurvedic interventions with standard of care to address the major challenges and gaps in medical management of the second wave of COVID-19 in India.

2. Patient Information

2.1. De-identified patient specific information

A 75-year-old man living in Mumbai, a retired government official by profession consulted his Ayurvedic general practitioner after undergoing hospitalized care for COVID-19 related Acute Respiratory Distress Syndrome (ARDS) with bilateral pneumonitis as well as Acute Renal Failure (ARF).

2.2. Primary concerns and symptoms of the patient

The patient mainly complained of persistent breathing distress requiring oxygen support five days after being discharged from hospital. He reported to be suffering from generalized weakness, severe constipation and reduced appetite. The patient was mainly concerned about the poor oxygen saturation levels that did not improve even after standard of care interventions for COVID-19.

2.3. Medical, family, and psycho-social history including relevant genetic information

The patient is a hypertensive, insulin dependent diabetic in the last twenty-five years. His father was also diabetic. Genetic history is not contributory in this case. He did not report any addictions and leads a quiet life at home after retirement from public service.

2.4. Relevant past interventions with outcome

Patient was operated for prostatomegaly seventeen years ago. He is on medications for diabetes and hypertension in the past 25 years. After testing positive for COVID-19, patient developed breathing distress on exertion, intermittent fever, cough with expectoration, loss of appetite, general weakness and tachypnea. He had severe constipation requiring soap water enema for evacuation. He was admitted to a hospital on 01/04/2021 and was subsequently diagnosed with Acute Respiratory Distress Syndrome and bilateral pneumonitis as well as Acute Renal Failure. He was admitted to ICU and was on Non-Invasive Ventilation for two weeks. During the hospital stay, he was administered a course of antibiotics, steroids, blood thinner and also pirfenidone to prevent lung fibrosis. Insulin, anti-diabetic and anti-hypertensive medications were administered to manage existing co-morbidities along with multivitamin tablets, vitamin C and zinc. He was catheterised using a Foley's catheter and needed soap water enema to move his bowels. He was discharged from the hospital on 16/04/2021 in a hemodynamically and clinically stable condition but with persistent breathing difficulty and reportedly low oxygen saturation levels. Pulse oxymetry reading at the time of discharge has not been documented in the discharge card. He was advised home oxygen therapy (4 L/min) at home for 30 days along with other medications.

3. Clinical Findings

At the time of seeking Ayurvedic treatment, the oxygen saturation of the patient was fluctuating between 80 and 85% and the patient was on continuous home oxygen therapy. The patient was slightly overweight with a BMI of 26.7 (Height 150 cms, Weight 60 kg) and moderately built. His lab test report from the previous week reported HbA1c value of 8.7 and at that time blood pressure was 150/100 mm of Hg. Patient had tachypnea and was bedridden. On interrogation, the patient revealed that he possibly contracted the virus when he visited a nearby marketplace. Ayurvedic clinical assessment indicated reduced *Agni* (digestive and metabolic functions), *Bala* (strength) and *Ojas* (vitality). However, the *Sattva* (mental strength) of the patient was good.

4. Timeline

Important information from the patient's treatment history has been organised in the form of a timeline. See Figure 1.

5. Diagnostic Assessment

5.1. Diagnostic testing (such as PE, laboratory testing, imaging, surveys)

Patient was tested positive for COVID-19 by RT PCR on 01/04/2021. HRCT scan on 02/04/2021 revealed patchy areas of consolidation in upper and lower lobes of both lungs, moderate involvement of both lungs (50-75% involvement of parenchyma) and CT Score was 24/40. At the time of admission, NLR was 9, CRP - 55.65 mg/L, IL-6 – 33 pg/ml, Serum Creatinine - 1.96 mg/dL, SGOT – 51.5 U/L, Blood Urea – 46 mg/L and BUN – 21.56 mg/dL. In the course of the hospital stay, LDH was found elevated at 829 IU/L (07/04/2021). D-Dimer and Ferritin were within normal limits. The laboratory values just before discharge from hospital (14/01/2021) were as follows - Hb - 10.7 g/dl, WBC - 6980 with NLR 8.6 (N-86, L-10), Platelet - 1.90 lakhs/cumm, CRP - 3.08 mg/L, LDH – 463 IU/L. HbA1c was 8.7 indicating poor control of diabetes.

5.2. Diagnostic challenges (such as access to testing, financial, or cultural)

From the reports of the patient, it is not clear whether COVID-19 diagnosis was established by RT-PCR or Rapid Antigen Test (RAT). The headline of the report is RT-PCR but the result says Antigen Positive and CT Value is not mentioned. In the second wave of the pandemic in India, labs have been overwhelmed with increasing RT-PCR tests for confirming COVID-19 diagnosis. Positive RAT with clinical presentation of COVID-19 and supportive HRCT findings seems to be the basis of diagnosis. Other relevant laboratory tests such as inflammatory markers for COVID-19 were done to establish the diagnosis. However, a repeat Rapid Antigen or RT PCR was not done as it is not mandatory for hospital discharge or after 14 days of testing positive for COVID-19. Moreover, patients find it difficult to repeat these test after recovery. Chest X'Ray was done a week after hospital discharge. Further HRCT assessment was deemed unnecessary considering the cost and risk of exposure to harmful radiation.

5.3. Diagnosis (including other diagnosis considered)

Biomedical diagnosis: The diagnosis was COVID-19 (patient was tested antigen positive and presented with clinical features typical of COVID-19) with ARDS and bilateral pneumonitis (based on HRCT findings). On the basis of Renal Function Tests, which revealed slightly elevated creatinine, blood urea and blood urea nitrogen, he was diagnosed to be also suffering from Acute Renal Failure at the time of hospitalisation. Insulin dependent diabetes and hypertension are known co-morbidities.

Ayurvedic Diagnosis: The clinical picture at the time of Ayurvedic assessment was that of a patient in the stage of transition to *Jīrṇajvara* (chronic fever). Retrospective analysis of the case history and course in the hospital pointed to a primary diagnosis of *Sannipātajvara* showing dominance of *Vāta* and *Kapha* with association of *Pitta*⁶ and residual effects in the *Prāṇavahasrotas*.

5.4. Prognosis

The patient had recovered from the acute stage of ARDS and bilateral pneumonitis following hospitalized standard of care intervention for COVID-19. Inflammatory markers and creatinine were showing a normalizing trend. The patient was expected to recover gradually at home, though the possibility of long covid syndrome or further deterioration could not be ruled out. Co-morbidities with poor control of diabetes and hypertension as well as acute renal failure along with persistent breathing difficulties suggest challenges in recovery. At the time of discharge, the patient was expected to require at least one month of home oxygen therapy before further review.

6. Therapeutic Intervention

6.1. Types of therapeutic intervention (such as pharmacologic, surgical, preventive, self-care)

Standard of Care Pharmacological Interventions: Treatment administered in the hospital has been discussed in the section on past treatments. The patient was discharged from hospital with the following prescription. He was advised to taper and discontinue Omnacortil (20 mg for three days, 10 mg for three days and 5 mg for three days). Other medicines were Feropenen 200 mg 1-0-1 for 2days; Tab. Dobirex 150 mg - 1-0-1 and Tab. Perfinex 200 mg - 1-0-1 for 45 days; Tab. Janumet 50/500 - 1-0-1 for 15 days; Tab. Nexovas 10 mg - 1-0-0, Tab. Cobadex CZS - 0-1-0, Tab. Limsee 500 mg - 1-0-1 and Tab. Zinc 50 mg - 0-1-0 for 30 days; Inj. Lantus - 8 Units for 30 days; Levoflox 500 mg - 1-0-0 for 7 days and Cap.

Uprise D3 60k once in a week for 4 weeks. Except anti-diabetic and anti-hypertensive medications, patient did not take any of the above discharge medications prescribed to him.

He was advised Home Oxygen Therapy @ 4L/min for thirty days.

Ayurvedic Pharmacological Interventions: Only internal medications were administered to the patient. *Rasasindūra*⁷, *Apāmārgakṣāra*⁸, *Pippalīmūlacūrṇa*⁹ and *Ṣaḍdharāṇacūrṇa*⁸ were administered sublingually. *Indukāntaṃ Ghṛtaṃ*¹⁰ and *Suvarṇamālinīvasanta Rasa*¹¹ were administered internally. See Table 1 for details of Ayurvedic medicines administered.

Ayurvedic dietary regimen: Patient was advised to take rice, roti, dal, vegetables prepared with minimal oil or ghee and locally available fruits. He was told to avoid milk and milk products.

6.2 Administration of therapeutic intervention (such as dosage, strength, duration)

Ayurvedic medicines were administered from 21/04/2021 until 30/04/2021. Table 1 summarises the details of administration of Ayurvedic medicines in this patient in the oxygen dependent phase.

From 26/04/2021, the patient was advised to take 1 teaspoon (5 ml) of *Indukāntaṃ Ghṛtaṃ* with 1 tablet of *Suvarṇmālinīvasanta Rasa* three times for a week. Thereafter, he was advised to continue only the anti-diabetic and anti-hypertensive medications.

6.4. Changes in therapeutic intervention (with rationale)

After discharge from hospital, the patient had persistent breathing distress. He needed home oxygen therapy at home and sought Ayurvedic treatment for relief. He was administered a combination of *Rasasindūra*, *Apāmārgakṣāra* and *Pippalīmūlacūrṇa*, as well as *Ṣaḍdharāṇacūrṇa* with the Ayurvedic clinical assessment of Vata involvement in the Amasaya (upper gastrointestinal tract)¹². These medicines were administered at regular intervals of 10 mins for the first 24 hours. When improvement of oxygen saturation levels were observed, it was inferred that clearance of the srotas (channels) and improvement of agni (digestive fire) had been achieved. Conservative administration of medicated ghee (*śamanaghṛtapāna*) in line with the principles of management of chronic fever (*jīrṇajvaracikitsā*) was initiated as three weeks had passed since the onset of the fever.¹²

7. Follow-up and Outcomes

Within twelve hours of sub-lingual administration of Ayurvedic medicines every 10 minutes, oxygen saturation levels of the patient improved from 80-85% to 90-95% (21/04/2021). After two days of administration of *Indukāntaṃ Ghṛtaṃ* with *Suvarṇmālinīvasanta Rasa*, home oxygen therapy could be withdrawn completely and SpO2 levels were maintained above 95% (23/04/2021).

After discontinuation of Ayurvedic medicines (30/04/2021), patient has been followed up for clinical evaluation. His oxygen saturation levels are stable between 95-98%. Last SpO2 reading was taken on 11/05/2021. He does not complain of breathing distress. He is continuing anti-diabetic and anti-hypertensive medications.

7.1 Clinician and patient-assessed outcomes

Clinician assessed outcomes: There are no specific clinician assessed outcomes to report other than what is discussed in the section on diagnostic assessment and rationale of treatment.

Patient assessed outcomes: There are no specific or relevant patient assessed outcomes to report in this case.

7.2. Important follow-up diagnostic and other test results

On 23/01/2021, the second day of starting Ayurvedic treatment CRP was high at 11.46 mg/dL, WBC was 10,900 with NLR of 9 (N-81, L-9 and LDH – 300 IU/L. Chest X'Ray revealed haziness in right lower zone obliterating right costophrenic angle and may be indicating fibrosis. On 30/04/2021, Liver Function Test parameters were found to be within normal range. On 11/05/2021, CRP was normal at 5.8mg/dL as well as WBC- 8790/cumm with NLR of 2.5 (N- 65, L- 26). Pulse oxymetry readings were consistently above 95% throughout the follow up period.

7.3. Intervention adherence and tolerability

The patient could tolerate the administration of Ayurveda medications and had strictly adhered to the advised medications, diet and lifestyle during the short course of Ayurvedic treatment.

7.4. Adverse and unanticipated events

The patient did not report any adverse or unanticipated events during or after administration of Ayurvedic treatment.

8. Discussion

8.1. A scientific discussion of the strengths AND limitations associated with this case report

The data presented in this case report is restricted by the limitations of clinical practice. Due to the COVID-19 emergency situation, the patient was consulted remotely and elaborate physical examination was not possible. As discussed, it is not clear from available reports whether COVID-19 diagnosis was established by RT-PCR or Rapid Antigen Test. Only most relevant laboratory parameters were tested after initiation of Ayurvedic treatment and the patient was not inclined to repeat the tests once he was weaned off oxygen support and improved clinically. Renal function tests were done at the time of hospital admission and creatinine was monitored in the first few days of hospital stay. These tests were not repeated later in spite of a diagnosis of Acute Renal Failure. It is a strength of this case report that the severity of the patient's condition requiring hospitalised care and oxygen supplementation in the post-hospitalisation period have been well documented in the available medical records with relevant investigations and clinical assessment of treating physicians. It was five days since the patient had discontinued allopathic medications when Ayurvedic treatment was initiated. His oxygen saturation levels were poor (80-85% with oxygen support), which improved within 12 hours of administration of Ayurvedic treatment and oxygen support could be withdrawn subsequently on the third day. In the light of these observations, we are able to propose the hypothesis that Ayurvedic interventions have the potential to facilitate recovery in hypoxic COVID-19 patients and reduce oxygen dependency.

8.2. Discussion of the relevant medical literature with references

COVID-19 patients can require oxygen support at home even after they are discharged from hospital. One study reported higher rates of readmission, multiorgan dysfunction and death in COVID-19 patients after hospital discharge compared to matched controls¹³. Due to increase in rate of hospitalisation of COVID-19 patients, strategy for transitional care of patient from hospital to home has been proposed to reduce inpatient days in the hospital¹⁴. Ambulatory management of COVID-19 with home oxygen therapy has been associated with reduced mortality and readmission rates thirty days after discharge from hospital¹⁵. The COVID-HOT algorithm has been developed for providing safe and effective home oxygen therapy for COVID-19 patients¹⁶. A study on post-discharge health status of COVID-19 patients surveyed the participants at a median of 37 days after hospital discharge. It was found that 36.8% required home oxygen and 13.5% were still on oxygen support at the time of the survey¹⁷. In the case of our patient, home oxygen was prescribed for 30 days after discharge, but oxygen support could be withdrawn on the third day after starting Ayurvedic treatment, which was the seventh day after discharge from the hospital. Mumbai become the epicentre of the second wave of the pandemic in India overburdening the health care system. Patients were being discharged after essential critical care at hospital for continued supportive care at home. The SpO₂ levels of our patient was not found mentioned in the hospital discharge card. At the time of starting Ayurvedic treatment, it was far below levels recommended for home care (80-85%) even with oxygen supplementation. We could not determine if this was indicative of deterioration in his condition at home in the first five days after discharge. It is pertinent to note that the patient did not continue the discharge prescription except for anti-diabetic and anti-hypertensive medications.

8.3. The scientific rationale

The frequent administration of the combination of *Rasasindūra*, *Apārmārgakṣāra*, *Pippalīmūlacūrṇa* and *Ṣaḍdharaṇacūrṇa* was found to improve oxygen saturation levels within few hours. Frequent administration of medicines is indicated in management of respiratory distress. Sublingual administration enables the medicine to be absorbed quickly and spread through the *prāṇavahasrotas* (respiratory system) to exert its pharmacological action. It has been proposed that Ayurvedic metal nano particles could be repurposed as novel antiviral agents against SARS-CoV-2. Some commonly used Ayurvedic nano-metallic preparations could have anti-inflammatory and immunomodulatory activity¹⁸. *Rasasindura* and *Suvarṇamālinī Vasanta Rasa* are both such nano-metallic herbo-mineral preparations administered to our patient. Of these, *Rasasindūra* was administered for its short term effects and *Suvarṇamālinī Vasanta Rasa* for sustained effect. *Apārmārgakṣāra* is an alkaline substance obtained from the ashes of the plant *Achyranthes aspera*. It has the ability to remove the blockage of thick mucus, relieve congestion and open the respiratory and circulatory channels. *Pippalīmūlacūrṇa*, the powder of the roots of *Piper longum* pacifies Vata and Kapha, which are involved in obstruction and fibrosis of lungs leading to breathing distress in COVID-19. *Ṣaḍdharaṇacūrṇa* is specifically indicated in the obstruction of *Vāta* in the gastrointestinal tract, which is according to Ayurveda the trigger for respiratory pathologies. *Indukāntaṃ Ghṛtaṃ* is indicated for strengthening digestive fire (*agni*), opening the channels (*srotas*) and for strengthening the body (*br̥mhaṇa*) after the acute stage of fever. One study reported its immunomodulatory property¹⁹

In the light of the known properties of the medicines administered to the patient and the results observed clinically, we presume that Ayurvedic interventions helped in reducing inflammation in the lung and clearance of fluids as well as in modulation of immunity. However, Specific mechanism of action of such medicines in hypoxia needs to be studied systematically.

8.4. The primary “take-away” lessons of this case report

The outcomes of Ayurvedic intervention reported in this paper points to the potential of Ayurvedic intervention to facilitate faster recovery in COVID-19 patients who require home oxygen after hospital discharge. Further studies are needed to evaluate the benefits of integrating Ayurvedic care in the rehabilitation of patients recovering at home from residual clinical manifestations of severe COVID-19 infection.

9. Patient Perspective

“I was afflicted with COVID 19 one and a half months ago. On 1st April, I started getting discomfort and was admitted at a hospital. On 16th April, I was discharged from the hospital and was advised to be on a dose of four litre oxygen/day for 30 days by the doctors. On 19th April, my oxygen saturation dropped, and I opted for Ayurveda treatment on 20th April. After 21st April, I started feeling better and by 23rd April, I could withdraw the support of oxygen. After that, my oxygen saturation was stable. By taking Ayurveda treatment, I could save a lot on my medical expenses and I could get rid of all the problems that were caused due to COVID.”

10. Informed Consent

Written informed consent has been obtained from the patient for publication of this case report and the full text of this manuscript has been shared with him. The document is made available to the editors for examination.

11. Author contributions

JJ, the first author is the treating physician who formulated the treatment protocol and was consulted by the patient for Ayurvedic care. JJ provided the summary of the diagnosis, treatment and observed outcomes and also collected the informed consent from the patient for publication of this case report. SNS, SSK and PEN organised and analysed the data in consultation with JJ and produced the first draft of the manuscript. They compiled relevant references from classical Ayurvedic texts. RP guided all the co-authors through every stage of preparation of the manuscript, provided scientific and technical inputs to develop the case report and redrafted the final version of the manuscript after several rounds of revision.

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Table 1 – Schedule of administration of Ayurvedic medications

Date	Rasasindūraṃ	Apāmārgakṣāraṃ	Pippalimūlacūrṇaṃ	Ṣaḍdharāṇacūrṇaṃ	Indukāntaṃ Ghṛtaṃ	Suvarṇamālinīvasanta Rasa
21/04/2021	15 mg every 10 minutes	25 mg every 10 minutes	10 mg every 10 minutes	1 pinch	X	X
22/04/2021	X	X	X	X	5 ml at 7:00 am	125 mg at 7:00 am
23/04/2021	X	X	X	X	10 ml at 7:00 am	125 mg at 7:00 am
24/04/2021	X	X	X	X	15 ml at 7:00 am	125 mg at 7:00 am
26/04/2021	X	X	X	X	5 ml at 7.00 am	125 mg at 7:00 am
28/04/2021	X	X	X	X	5 ml at 7.00 am	125 mg at 7:00 am
30/04/2021	X	X	X	X	5 ml at 7.00 am	125 mg at 7:00 am

Table 2 – Results of relevant investigations

	01/04	02/04	04/04	05/04	07/04	11/04	14/04	20/04	23/04	30/04	11/05
Hemoglobin (gm/dL)	11.5	11.4	11.6	11.6	12.5	11.1	10.7		11.3		
White Blood Cells (cells/mcL)	9900	6980	12220	10750	10960		6980		10900		8790
Neutrophils (%)	90	95	90	55	95	88	86		81		65
Lymphocytes (%)	10	3	10	40	3	10	10		9		26
NLR	9	31.7	9	1.38	31.7	8.8	8.6		9		2.5
Interleukin 6 (pg/mL)	33.8				15.1						
C Reactive Protein (mg/L)	55.65				13.30	9.09	3.08		11.46		5.8
Ferritin (ng/mL)	312.9				288.9	312.5					
HbA1c (%)							8.7				
Serum Creatinine (mg/dL)	1.96	2.03	1.58		1.5						
Blood Urea (mg/dL)	46.2										
Blood Urea Nitrogen (mg/dL)	21.56										
Lactate Dehydrogenase (U/L)					829.2	547.5	463		300		
SGOT (U/L)	24.7									15	
SGPT (U/L)	51.5									12	
SpO2 (%)	80-85							80-85	95	95-98	95-98
HRCT		24/40									

Note: RBC, Platelets, Serum Electrolytes, D-Dimer, INR, Prothrombin as well as Complete panel of Liver and Renal Function Tests were conducted during hospital stay. Only relevant lab results have been included in this table.

Figure 1 - Timeline

