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Case Report

Outcomes of Ayurvedic care in a COVID-19 patient with hypoxia – A case report

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ABSTRACT

This paper reports for the first time, the outcomes of Ayurvedic intervention in a COVID-19 patient with hypoxia requiring supportive oxygen therapy. Patient developed fever, severe cough, loss of smell, loss of taste, nasal block, anorexia, headache, body ache, chills, and fatigue and was hospitalised when she developed severe breathing difficulty. Later, she tested positive for COVID-19 by RT-PCR. The patient sought Ayurvedic treatment voluntarily when her SPO_2 remained at 80% even after being given oxygen support. The patient was administered Ayurvedic medicines while undergoing oxygen therapy at the hospital. The patient refused to take Fabiflu recommended by the treating physician and discontinued other Allopathic drugs except for Vitamin C. The patient showed clinical improvement within a day of administration of Ayurvedic medicines and was able to talk, eat, and sit on the bed without breathing difficulty and her SPO_2 became stable between 95 and 98%. In the next two days, she was asymptomatic without oxygen support and was discharged from the hospital in the following week. Since obesity and high plasma C-Reactive Protein (CRP) levels indicated high risk for progression to severe disease, the favourable outcomes with Ayurvedic treatment in this patient is significant and warrants further studies. Ayurvedic care may be considered as a first-line cost-effective alternative for COVID-19 patients presenting with symptomatic hypoxia in an integrative setup.

1. Introduction

COVID-19 is a highly infectious disease caused by the SARS-COV-2 that can lead to severe respiratory distress and complications in some patients [1]. Globally, researchers are working hard to discover effective antiviral agents, immunity modulators and vaccines, but an effective remedy is not yet in sight [2]. There is limited evidence for the efficacy of repurposed antiviral agents, antimalarials, steroids and plasma therapy in mitigating the severity of the disease or improving the clinical outcomes [3]. As the pandemic is escalating globally, the health care systems, even in developed nations are being overwhelmed by increasing number of patients. While supportive hospitalized care for severe and critically ill patients can help in the recovery, increasing occupancy of beds makes it challenging for patients to get timely attention and care. Not to mention patients presenting with mild and moderate symptoms who are increasingly being isolated at home. In India, the spread of COVID-19 was comparatively slow; however, as the lockdown restrictions are being eased, the country is experiencing alarmingly high surge in COVID-19 cases [4]. In many cities, hospitals are already overburdened and unable to respond to the challenging situation. In this scenario, it is important that a country like India with a pluralistic health care system should harness the potential of traditional systems of medicine like Ayurveda to fill gaps and unmet needs of patients within the framework of an integrative approach. The focus of Ayurveda on strengthening host factors in the management of infectious fevers, especially offers much scope for repurposing classical Ayurvedic formulations for the management of COVID-19. In this case report, we are reporting the outcomes of Ayurvedic intervention as supportive care to a COVID-19 patient who required oxygen support and hospitalisation. In the light of this case report, we are suggesting that Ayurvedic intervention may be considered in an integrative set up, as a first line option even in early stages of oxygen dependency before

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administering antiviral, antimalarial or other such drugs that are being evaluated on experimental basis for management of COVID-19.

2. Patient information

2.1. De-identified demographic and other patient information

A twenty-six year old female housewife travelled from Panvel to Alibaug on 11, June 2020 and was admitted to MGM Medical College and Hospital, Navi Mumbai on 21 June, 2020 with severe breathlessness. It was found that all the people she had come into contact with during her travel had tested positive for COVID-19.

2.2. Main concerns and symptoms of the patient

The patient experienced mild fever (101 degrees F) body ache and headache in the beginning and was administered an antibiotic and paracetamol. She also experienced sore throat, loss of smell and taste, anorexia and nose block. The fever subsided but cough became severe and progressed to acute breathlessness. At this time she experienced chills, extreme fatigue, nausea and headache. She needed oxygen support in the ambulance en route to the hospital.

2.3. Medical, family and psychosocial history including genetic information

The patient did not have any co-morbidities or other significant medical or genetic history. Her mother who is diabetic and hypertensive was diagnosed with breast cancer in November 2019 and underwent mastectomy. Her father underwent open heart surgery 17 years ago.

2.4. Relevant past interventions and their outcomes

The patient underwent surgical repair of her 4th metatarsal following a road accident. Post surgical recovery was uneventful.

3. Clinical findings

3.1. Relevant physical examination (PE) and other clinical findings

The patient complained of disturbed sleep, anxiety and confusion at the time of admission. She was suffering from acute breathlessness, was bedridden and needed continuous oxygen support. Her oxygen saturation was 80%. With a height of 4′ 11″ and weight of 83 kg, she was found to be obese with a BMI of 37. Ayurvedic assessment of the patient could only be done remotely. However, interrogation indicated that her *agni* (digestive capacity) was weak and she could not eat well. Her *ojas* (vitality) was low and she was feeling very fatigued. See Fig. 1 for the events related to the care of this patient organised as a timeline.

4. Diagnostic assessment

4.1. Diagnostic methods

History of presenting complaints and clinical presentation suggested a diagnosis of COVID-19 and hence, oral swab was sent for RT-PCR test on the second day of admission. At the time of admission, several lab tests (enlisted below along with results) were done. The tests were not repeated at the time of discharge. CRP was found to be high. Ayurvedic assessment was done based on clinical presentation of the disease as understood by conversation with the patient and caretakers.

Hb – 10.1 g/dl; TLC – 5610; RBC – 3.94 million/cu.mm; Neutrophils 70%; Lymphocytes 30%; Platelet 2.94 lakhs/cu.mm; CRP – 98.70 mg/L; LDH – 197 U/L; T. Bilirubin – 0.58 mg/dl; D. Bilirubin – 0.17 mg/dl; SGOT – 23 U/L; SGPT – 11 U/L; Alkaline Phosphatase – 128 U/L; Total Protein – 6.49 g/dl; Albumin – 3.22 g/dl; Globulin – 3.27 g/dl; A/G Ratio – 0.98; BUN – 6.1; Creatinine – 0.61; Urea 13; Sodium – 134; Potassium – 38; Chloride – 101; INR – 0.98 s.

4.2. Diagnostic challenges

Patient was kept in COVID-19 isolation ward on the basis of clinical assessment. The diagnosis of COVID-19 could be confirmed only on the fourth day of admission when the test result was found to be positive. In accordance with the state government policy, the patient was not tested again before being discharged from the hospital and so it was not possible to accurately estimate the time taken for testing negative after initiation of treatment. A comprehensive Ayurvedic clinical assessment was not possible as there was no direct access to the patient who was isolated in the hospital.

4.3. Diagnostic reasoning including differential diagnosis

Diagnosis was confirmed by RT-PCR test. At present, ICMR recommends detection of SARS-CoV-2 RNA by RT-PCR, TrueNat or CBNAAT Test for confirming diagnosis of COVID-19 [5]. Respiratory illness due to bacterial infection or common influenza virus was ruled out by testing for COVID-19. However, clinical presentation was also taken into consideration to confirm diagnosis as RT-PCR tests sometimes give false positive results. The initial symptom was fever and soon the patient developed cough and breathing difficulty. She also had other symptoms like nasal block, headache, body ache and chills, especially low-grade fever, which are typical of *jvara* (fever) with dominance of *vata-kapha*. High CRP levels indicated the development of severe inflammation and involvement of *pitta*. In consideration of these findings, the diagnosis of *vataka-phapradhana sannipatajvara* with *pittanubandha* was arrived at.

4.4. Prognostic characteristics when applicable

The clinical presentation of the patient suggested moderately severe disease with low oxygen saturation of 80%. Such patients may progress to more severe and critical stages needing ventilatory support. In the hospital, she was administered oxygen but her SPO_2 readings continued to remain at 80% indicating the possibility of progression to severe disease. The patient had very high plasma CRP levels, which is positively correlated with severity of disease in COVID-19. Patient was obese with a BMI of 37, which is also identified as a risk for severe disease.

5. Therapeutic intervention

5.1. Types of intervention (modern pharmacological)

On admission (21 June 2020, around 8 pm), she was prescribed the following medicines.

1. Azee (Azithromycin) 625 mg 1-0-0
2. Cefexime 200 mg 1-0-1
3. T. Dexamethasone 6 mg 1-0-0
4. T. Acetaminophen 650 mg SOS

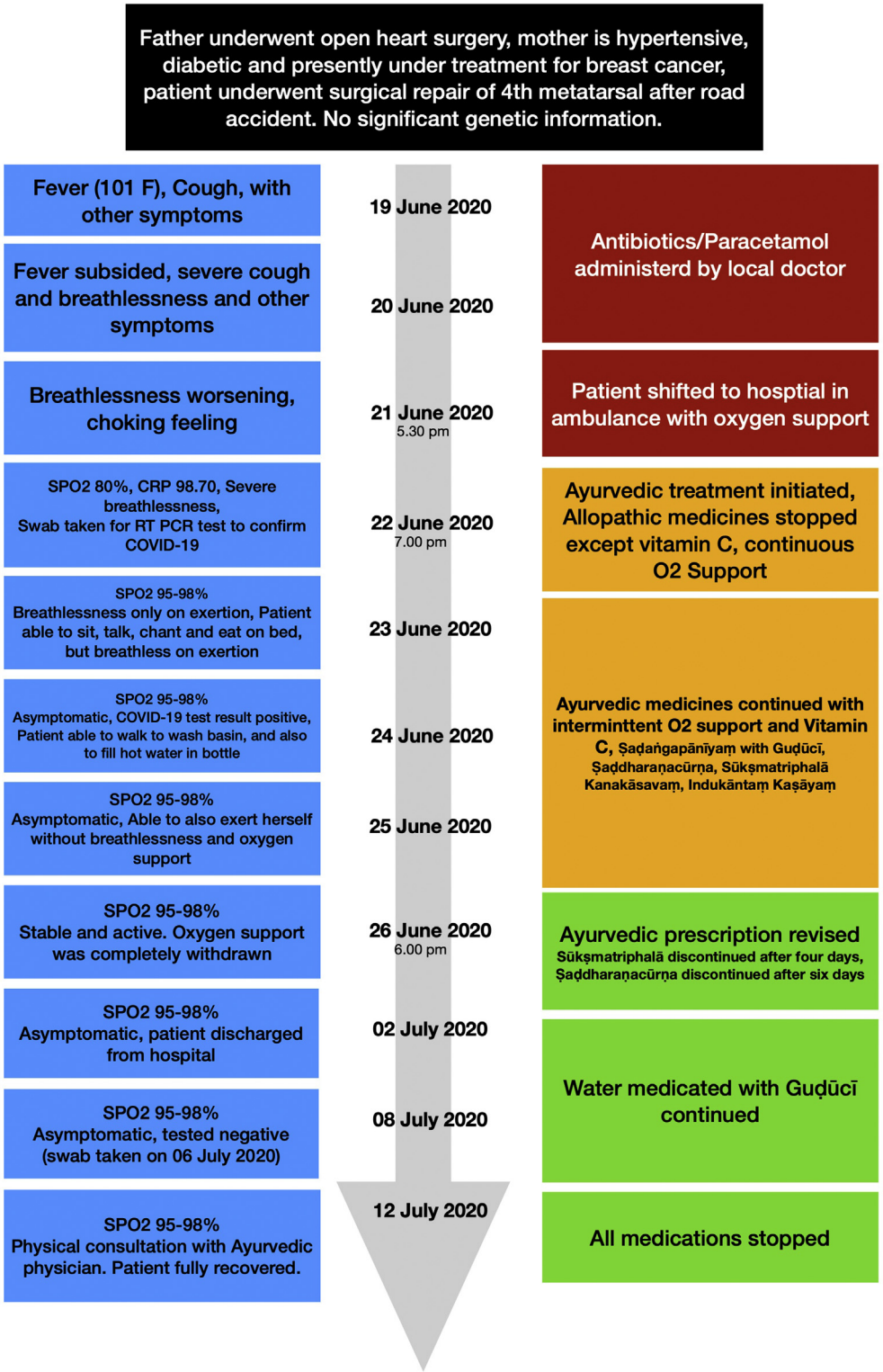

Fig. 1. Timeline depicting the course of the disease, diagnosis, interventions and outcomes.

5. T. Vitamin C 500 mg 1-0-1
6. T. Pantoprazole 40 mg 1-0-0
7. C. Becosule (Vitamin B Complex) 1-0-0
8. Syp. Grilinctus (Guaifenesin, Chlorpheniramine maleate and Ammonium chloride) 2 tsp 1-1-1

The doctors suggested the option of starting Fabiflu, but the patient declined to take this medicine. She stopped taking all the above prescribed medicines after starting the Ayurvedic treatment (22 June 2020 by 7 pm). Only Vitamin C and oxygen support was continued.

5.2. Types of intervention (Ayurveda)

On the evening of the second day of hospitalisation, she opted for Ayurvedic treatment by consulting Ayurvedic physician by video calling. She was administered the following Ayurvedic medicines immediately.

1. *Sadangapaniyam* with *Guduchi*
2. *Saddharanacurna*
3. *Suksmatriphala*
4. *Kanakasavam*
5. *Indukantam Kasayam*

The dosing and duration of the administration of these medicines are summarised in Table 1. After discharge, the patient was advised to drink *Guduchi Paniyam* 1–2 sips every two hours.

It was challenging to administer a suitable Ayurvedic diet at the hospital. The patient was advised to take chapathis with garlic and mint chatni. Apart from that, she was asked to take only pomegranate fruits. This diet was strictly followed for three days. After she recovered clinically, she switched back to normal diet.

5.3. Changes in interventions with explanations

After hospitalisation and continued breathlessness even after oxygenation, the patient decided to opt for Ayurvedic treatment by her own choice. The first dose of Ayurvedic medicine was administered by 7 pm on 22 June 2020, the second day of hospitalisation. She declined the option of taking Fabiflu and also discontinued other Allopathic medications except Vitamin C. *Saddharanacurna* was discontinued to prevent it from inducing *ruksata* (dryness) after seven days when breathlessness was completely relieved. *Suksmatriphala* was discontinued after four days when the patient was taken off oxygen support and there was no indication of any lung infection like pneumonia which is a known complication in COVID-19. *Sadangapaniyam* with *Guduchi*, as well as *Kanakasavam* and *Indukantam Kasayam* was continued up to the point of being discharged from the hospital to support immunity, kindle digestive fire and to keep the *pranavahasrotas* (airways) patent. After discharge, the patient has been advised to drink *Guduchi Paniyam* (water medicated with stem of *Tinospora cordifolia*).

6. Follow up and outcomes

6.1. Clinician and patient-assessed outcomes

On the next day, the third day of hospitalisation, the patient was able to sit, speak and eat without oxygen support. However, the SPO_2 was 80% and intermittent oxygen support was needed as she still had severe breathing difficulty. But, with additional doses of Ayurvedic medicine, her condition improved noticeably. On the fourth day of hospitalisation, her cough became mild and breathing difficulty was experienced only on exertion. All other symptoms subsided except for mild headache. The SPO_2 levels improved and stabilised at 95–98%. She was maintained on intermittent oxygen, which was completely withdrawn on 26 June 2020 by 7 pm. Futher, Ayurvedic treatment was continued along with Vitamin C supplementation. She was not given any other medications. The daily clinical progress of the patient is summarised in Supplementary Table S1.

6.2. Important follow-up diagnostic and other test results

The patient was discharged on the 11th day and was afebrile and vitally stable with SPO_2 of 98%. As per protocol, a repeat test for COVID-19 was not done at the hospital because she recovered clinically. No blood tests were repeated as she showed remarkable clinical improvement. On 8th July, 2020, five days after discharge from the hospital, the patient repeated the RT PCR test for COVID-19, which turned out to be negative. She visited the Ayurvedic clinic for consultation on 12th July, 2020 and was found to have clinically recovered completely and hence all medications were stopped.

6.3. Intervention adherence and tolerability

The patient opted for Ayurvedic treatment out of her own will and was very enthusiastic to continue the treatment because she responded well to the medicines administered. On the other hand, she was not willing to take any of the Allopathic medicines administered to her.

6.4. Adverse and unanticipated events

No adverse or unanticipated events were reported by the patient.

7. Discussion

7.1. Strengths and limitations in the approach to treating this case

The patient was quite motivated to follow Ayurvedic treatment and was very compliant and communicative. The patient did not continue Allopathic medications. The main limitation was that the consultation could only be done by phone and video calls. However, the patient kept giving feedback periodically and sent video updates as well. The medical records of the patient could not be accessed and so CT scan findings, vitals like respiratory rate and blood pressure could not be obtained. The patient has no history of hypertension. Hypoxia as evidenced by low oxygen saturation, elevated CRP and in addition, obesity as a risk factor for severe disease provides essential inputs for assessment of the severity of her clinical condition. Diet is an important part of Ayurvedic

Table 1
Administration of Ayurvedic medications.

Date	*Saddharanacurna*	*Sadangapaniyam with Guduchi*	*Suksmatriphala*	*Kanakasavam*	*Indukantam Kasayam*
22 Jun 2020	1 pinch every hour	One sip every 10 minutes	250 mg tab at bed time	1 ml every two hours	1 ml every two hours
23 Jun 2020	1 pinch every hour	One sip every 10 minutes	250 mg tab thrice daily	1 ml every two hours	1 ml every two hours
24 Jun 2020	1 pinch every hour	One sip every 10 minutes	250 mg tab thrice daily	1 ml every two hours	1 ml every two hours
25 Jun 2020	1 pinch every hour	One sip every half hour	250 mg tab thrice daily	1 ml four times a day	1 ml four times a day
26 Jun 2020	1 pinch every hour	One sip every half hour	×	1 ml four times a day	1 ml four times a day
27 Jun 2020	1 pinch every hour	One sip every two hours	×	1 ml four times a day	1 ml four times a day
28 Jun 2020	1 pinch every hour	One sip every two hours	×	1 ml four times a day	1 ml four times a day
29 Jun 2020	×	One sip every two hours	×	1 ml four times a day	1 ml four times a day
30 Jun 2020	×	One sip every two hours	×	1 ml four times a day	1 ml four times a day
01 Jul 2020	×	One sip every two hours	×	1 ml four times a day	1 ml four times a day
02 Jul 2020	×	One sip every two hours	×	1 ml four times a day	1 ml four times a day

treatment. It was, however, challenging to prescribe a proper diet in the Allopathic hospital. A dietary regimen based on Ayurvedic principles was recommended based on available food items, which the patient complied with. In this patient, we could not assess the number of days taken for the patient to test negative as a repeat test is not being done at hospitals as a protocol for patients who recover clinically completely. The repeat test could only be done four days after discharge of the patient from the hospital. However, the complete clinical recovery was seen on the fourth day after starting Ayurvedic treatment.

7.2. Discussion of the relevant medical literature

COVID-19 is a new disease caused by the novel coronavirus (SARS-CoV-2). Although antimalarial, antiviral, steroid and other drugs are being repurposed to treat the disease, the experiments and trials have been inconclusive. Standard of care is symptom focused and supportive. However, about 81% of COVID-19 patients experience only mild to moderate symptoms or may even be asymptomatic and recover without need for focused medical attention. About 14% may progress to severe disease requiring oxygen support and may also develop pneumonia. About 5% are likely to develop complications like Acute Respiratory Distress Syndrome and severe pneumonia requiring ventilator support [6]. Multiple organ failure, clotting of blood and other complications are encountered in critically ill patients [7]. People with advanced age and those suffering from co-morbidities have been reported to be at a high risk for severe disease, complications and death [8]. Peripheral oxygen saturation of less than 92% has been reported as an independent predictor for severe disease in hospitalised COVID-19 patients [9]. Obesity and a BMI of above 30 is also correlated with risk for severe disease [10]. High plasma levels of CRP in early stages of the disease is also strongly associated with risk of progression to severe disease [11]. The patient in our case report had a peripheral oxygen saturation of 80% even after administering oxygen, was obese and plasma CRP was 98.70.

Classical Ayurvedic texts refer to epidemic outbreaks of respiratory illnesses [12] and give guidelines for studying new diseases and developing treatment protocols [13]. A preliminary Ayurvedic clinical profile of COVID-19 has already been published characterising the disease as a variant of *vatakaphasannipatajvara* with *pittanubandha* [14]. A case report has described the outcomes of Ayurvedic intervention in a COVID-19 patient with severe breathing difficulty who recovered with only supportive Ayurvedic care [15]. A pragmatic Ayurvedic treatment protocol for management of COVID-19 has also been proposed in a research publication [16]. Moreover, *in silico* studies have indicated that many herbs used in Ayurveda could have the ability to prevent cell entry of the SARS-CoV-2 virus [17,18]. While there is no conclusive evidence yet of the efficacy of specific Ayurvedic herbs, formulations or treatment protocols for COVID-19, it appears quite reasonable and plausible that Ayurveda can provide supportive care for patients diagnosed with COVID-19.

7.3. The rationale for the conclusions

With COVID-19 being self-limiting in majority of patients, it is not possible to draw definite conclusions about efficacy of any medical intervention with data from a single patient. However, this case points out the potential for Ayurveda to be considered as a first line and cost-effective intervention even in COVID-19 patients with severe hypoxia. The oxygen saturation of the patient remained at 80% even after providing oxygen and Allopathic medications. After administration of Ayurvedic medicines, the oxygen saturation of the patient normalised within a day and oxygen support could be gradually withdrawn. The patient was clinically symptom-free after just two days of Ayurvedic treatment. The remaining one week of her stay in the hospital was uneventful. On the basis of this observation, we propose that Ayurvedic treatment may be considered even in moderately severe COVID-19 patients on oxygen support and its role in preventing the progress of the disease to more severe stage should be investigated by conducting larger studies. The classical indications of the medicines administered to this patient point to their relevance in the management of COVID-19. As discussed in the section on diagnosis, the patient presented with symptoms indicating *vatakaphasannipatajvara* with indications of increasing *pitta* dominance. The patient was administered *sadangapaniyam* (medicated herbal water made of six herbs) for *dipanapacana* (stimulating digestion and metabolism). *Guduchi* (*T. cordifolia*) was added to make the combination balanced in addressing the imbalance of all three *doshas*. *Sadangapaniyam* has a specific action on *pitta* in fevers [19] while *guduchi* can also additionally act on *vata* and *kapha* apart from *pitta* [20]. Considering the fast progression of breathlessness and hypoxia, with the subjective experience of inability to breathe, the blockage/covering (*avarana*) of *vata* in the *amasaya* (upper gastrointestinal tract) was considered. Breathlessness and cough are mentioned as symptoms of this condition termed as *amasayagatavata* and *saddharanacurna* has been specifically indicated in this context [12,13]. Breathing difficulty caused by obstruction of *vata* by *kapha* has also been clearly mentioned in the texts to be originating in the *amasaya* [19]. On the basis of this clinical judgement, *saddharanacurna* was administered for seven days. *Suksmatriphala*, which is a combination of *triphala* with *kajjali* (combination of mercury and sulphur) is a *rasayana* (immunity bolstering agent) [21]. It is widely used in management of upper and lower respiratory tract. This medicine was administered to prevent infection and support the immune system of the patient. *Kanakasavam* was also administered for relief from dyspnoea, which is a main indication of this formulation. It works as an expectorant and dilates the airways [22]. The above medicines were given in divided small doses at short intervals (see Table 1) based on the principle of frequent drug administration (*muhurmuhur*) in poisoning, vomiting, thirst, hiccup, dyspnoea and cough [19]. *Indukantam kasayam* was administered for strengthening the digestion and metabolism, to control and prevent recurrence of fever and also to enhance the strength of the patient [23]. *Indukantam kasayam* is indicated in diseases with dominance of *vata*, depletion (*ksaya*), intermittent fever (*nimnonnatajvara*) and especially for improving strength (*bala*). A previous study exploring the effects of *Indukantam Ghritam* (the same decoction cooked in ghee) as an adjuvant in cancer chemotherapy reported it to be capable of inducing leukopoiesis as well as activation of non-specific and specific immune mechanisms of the host [24]. Ayurveda recognises the causative role of a virus as an external agent in diseases like COVID-19. COVID-19 could be classified as an *agantukajvara* (fever of exogenous origin) caused by *bhutabhisanga* (bhuta also means virulent microbes), the contact with virulent microorganisms [14]. However, the focus of Ayurvedic treatment is on strengthening host factors like *agni* (digestive and metabolic functions) and *bala* (innate strength of body and mind) as well as restoring the balance of the *doshas* (restoring functional integrity of the body) to overcome the infection and recover from the disease.

Conclusion

This case report suggests the potential of Ayurvedic supportive care for recovery of COVID-19 patients even when they are oxygen-dependent. In this case, the patient declined Fabiflu because of the prohibitive cost, uncertainty of benefits and potential side-effects. The role of Ayurvedic management as a cost-

effective first line intervention even in patients with poor oxygen saturation within an integrative framework may be explored through further studies. As COVID-19 cases are increasing in India and overwhelming the health care system, Allopathic hospitals are overburdened with patients. In this scenario, Ayurvedic care based on an individualised and whole system approach could fill gaps and unmet needs in our response to the COVID-19 challenge.

Patient perspective

The patient voluntarily shared video clips explaining her perspective and experiences as a COVID-19 patient during and after the course of Ayurvedic treatment. The summary of the transcript of the videos is given below.

"At the time of starting Ayurvedic treatment, I was hospitalised and on oxygen support. I was not able to breathe properly or do any activity and was completely bedridden. My oxygen saturation was 80% and I was finding it difficult to breathe without oxygen even after one day of admission. The Allopathic doctors recommended Fabiflu, but said that they are not sure if it will work and that there could be side-effects. The cost of the medicine is 6000 rupees and so I was not convinced to take a costly medicine which may not be helpful. In the meantime, I was tested positive for COVID-19. On the evening of the second day of admission, I consulted my Ayurvedic physician telephonically. She was very reassuring and sent Ayurvedic medicines to me at the hospital. I stopped all Allopathic medications except Vitamin C. After starting Ayurveda treatment, I started feeling better the next day (23 June 2020). I was asked to take these medicines every two hours and I complied with this advice. I was able to drink water which was impossible for me on the previous day (22 June 2020). I was able to sit and listen to the songs on mobile by my own, was able to talk, chant of *ramaraksamantra* (devotional hymn), and eat food. However, I was not able to walk and felt breathing difficulty when I tried to do so and would need oxygen support. On 24 June 2020, I was able to remove the oxygen mask by myself, walk up to the wash basin, walk up to the water vending machine to collect hot water and eat comfortably. On 25 June 2020, I was feeling completely alright and there was no need of oxygen. I was able to walk, eat and exercise. On 26 June 2020, the Allopathic doctor noticed that I was well and did not need oxygen and so they removed the oxygen support completely. In the following days, I continued to improve remarkably and remained asymptomatic. On 11th day of hospitalisation, I was discharged. The test for COVID-19 was not repeated in the hospital. I did the test after coming back home and it was found to be negative this time. I am continuing the Ayurvedic medicines and am very thankful to my Ayurvedic physician for the support and care given to me."

Informed consent

Written informed consent was obtained from spouse of patient before initiation of treatment. Written informed consent for publication of their clinical details was obtained from the patient and spouse of the patient. A copy of the consent form is available for review by the Editor of this journal.

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None.

Conflict of interest

None.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.jaim.2020.10.006.

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