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Case Report

Ayurvedic management of pregnant woman infected with SARS-CoV-2 – A case report

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ABSTRACT

Since 2020, the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) has spread globally and is the most threatening health crisis of our time. In this scenario, pregnant women represent a frail category of patients, as they are systematically excluded from trials and thus, a candidate for focused evidence-based care. The Ayurvedic management of second trimester pregnant woman having diagnosed with COVID-19 is reported in this paper. The serologically confirmed COVID–19 pregnant woman was symptomatic and was managed in a tertiary COVID health centre of Ayurveda. The patient became asymptomatic on the 5th day of treatment and on the 7th day, nasopharyngeal swab sample was taken for RT-PCR, which was negative. The patient was followed up to assess the obstetric and neonatal outcomes. The findings of this case report can be useful for understanding the possible clinical pathology of COVID-19 infection in pregnant woman and the holistic care protocol for the management of similar cases.

1. Introduction

The World Health Organization (WHO) declared COVID-19 as a Public Health Emergency of International Concern in December 2019. Among the vulnerable group, pregnant women are found to be at a greater risk of complications as pregnancy is already an immune-compromised state [1–3]. Clinical and management guidelines for COVID-19 infection have been formulated and are being revised from time to time [4]. This reported case serves as a novel evidence of the management of ante-natal case with COVID-19 disease with interventions of Ayurveda.

2. Patient information

A 25 year old, multigravida (gravida 3, para 2), with the gestational age of 20 weeks and 1 day presented with a complaint of fever, dry cough, body ache and headache since 3 days. She consulted at a private clinic and there she was advised for Rapid Antigen Test for COVID-19 on 27th August, 2020, which was positive. The patient was admitted on 28th August, 2020 in COVID Health Centre of All India Institute of Ayurveda.

On enquiry, the patient told that she was travelling with her family (her husband and 2 young children) in a public transport on 25th August, 2020. She travelled from her home town in Bihar state to Delhi for 2 days. On the course, neither of the family members or she herself, were tested for COVID-19.

She was asymptomatic before travelling, then gradually developed mild fever, associated with dry cough, generalised body ache, malaise and headache on the same day she came back to New Delhi.

The cough was exacerbated by intake of cold water and it was more frequent during evening. The patient also complained of headache; site was bilateral temporal and frontal region. It was relieved by sleep and rest and had moderate severity. There was no record of any associated co-morbidities, any surgical history or history of any allergy or past medication.

3. Clinical findings

The physical examination revealed fever (temperature 101.3 °F), pulse rate – 86/min and SpO2 level was 96% at the time of admission. Further repeated monitoring was done at regular intervals of 2 h during the hospital stay. Her nutritional status was

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good, weight was recorded to be 62 kg and her height was 5 feet 3 inches. On general examination, pallor, icterus, pedal oedema, lymphadenopathy were absent On inspection, size of uterus corresponded to 19–20 weeks. External ballottement was present, foetal heart rate was 138–140 beats per minute. Patient has *vata-kapha prakriti* (constitution), average *samhanana* (body built) and *pramana* (body proportion). She had *avara satva* (mental strength).

4. Timeline

Fig. 1 shows clinical symptomology of the patient on the timeline recorded from her status at home, during hospital stay and after discharge.

5. Diagnostic assessment

Rapid Antigen Test for COVID-19 was done for the patient on 27th August, 2020 which was positive and the patient was defined as a confirmed case of COVID-19 [12]. Nasopharyngeal swab was also collected for RT-PCR sampling of COVID-19. The patient was travelling from 23rd August, 2020 to 25th August, 2020 and was tested on 27th August, 2020. In coherence to available data, the mean incubation period was estimated to be 6.4 days ranging from 2.1 to 11.1 days [13].

The pathological complex can be conceptualized as "*Bhuta-abhishangajvara*" in Ayurveda (~fever due to infection of microbial organisms). Contributing aetiologies in the morbidity are *Nija* (~endogenous factors) and *Agantuka* (~exogenous factors). It can be correlated to *Aagantuja jvara* with (infectious disease) with a special reference to *Vata* dominant *jvara* (fever in Ayurveda), further manifested as the consequence of *Janapadodhwamsa* (epidemic) [14]. In this case, exposure to the virus refers to exogenous aetiology and exertion contributed to the pathology. The *doshas* inflict *rasa vaha srotas* and *sveda vaha srotas*, the foetus gets its mean of survival from *rasa vaha srotas and* thus, it may also be affected by *jwara*. Fig. 2 describes the pathogenesis of COVID-19 in pregnancy.

Following investigations were done during the course of hospital stay as per the regulations of Clinical Management Protocol: COVID-19 Table 1.

The investigation of C-reactive protein (CRP) was repeated on 3rd day of hospitalisation to determine further prognosis. On 3rd September, 2020 PCR assay for the throat swab sample was done using a SARS-CoV-2 real-time RT-PCR kit, which was negative.

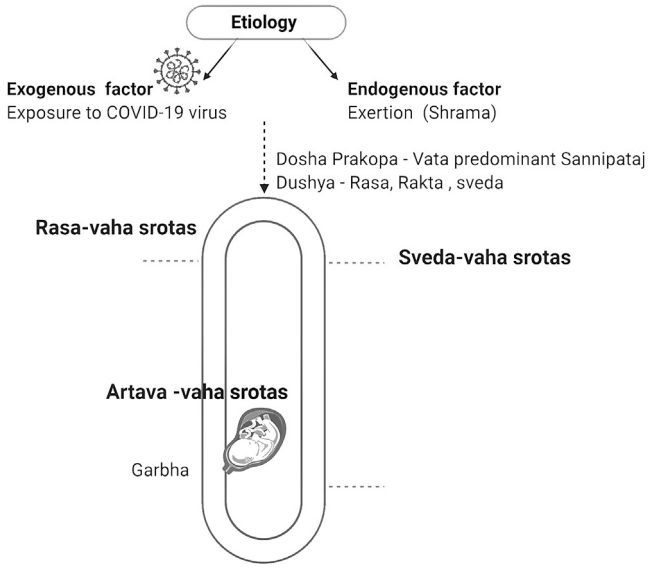

Fig. 2. Pathogenesis of COVID-19 infection in pregnancy.

Table 1
Investigations performed during the hospital stay.

Investigations	29/8/2020	2/9/2020
Hb	10.1 g/dL	–
ESR	39 mm/1st hr	–
PTINR	0.94	0.94
LDH	145.00 U/L	–
FBS	116 mg/dL	–
D-dimer	220 ng/mL	–
CRP	21.40 mg/L	14.40 mg/L
Sr.TSH	2.42 U/L	–
Sr Albumin	–	2.77 g/dL

ESR = Erythrocyte sedimentation rate, PTINR= Prothrombin time international normalized ratio, Hb = Hemoglobin, CRP = C-reactive protein, APTT = activated partial thromboplastin time, LDH = lactate dehydrogenase, TSH = Thyroid stimulating hormone, FBS = Fasting Blood sugar.

6. Prognosis

Morbidities in pregnant women are categorised under *krichh-sadhya vyadhi* (difficult to cure) [15]. The presented case is of moderate COVID-19 infection [16]. The prognostic biochemical

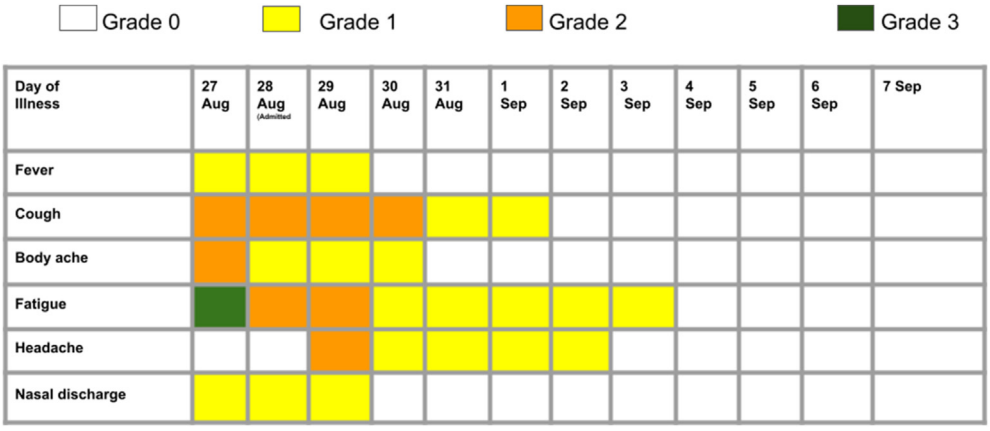

Fig. 1. Symptoms according to the day of illness between 25th August 25, 2020 to 7th September, 2020. Validated scales have been adopted for grading of symptoms [5–11].

markers including D-dimer level, erythrocyte sedimentation rate (ESR) and level of liver enzymes were within normal physiological limits in the patient.

7. Therapeutic focus and assessment

A holistic care protocol was adopted for this patient on the lines of *jwara nashak chikitsa* (anti-pyretic treatment) including *deepana – pachana* (carminatives) with *garbhasthapana aushadas* (drugs for foetal growth). Acharya Charaka has mentioned that morbidities in pregnant women should be treated by means of medicaments and diet that are palatable, cooling, pleasant and mild [17]. Considering the dual objectives of therapeutics in this case – intervention for COVID-19 infection and preservation of health of foetus was planned. Fig. 3 deals with the timeline of interventions.

The patient had *vibandha* (constipation), *jwara* (fever), malaise and was excessively lethargic. Considering the clinical presentation, it was decided to give her a *ghrita*-based preparation that can pacify the vitiated *Vata dosha*, has *rasayana* action, and enhance the assimilation of antipyretic medicine. Thus, the patient was initially administered *Sukumara ghrita* in the dose of 5 g, before meals with a frequency of twice a day with lukewarm water. The drugs in this formulation are majorly *madhura rasa dravya* [18]. Additionally, this *ghrita* has *vata-nashan* action, *deepaniya* (carminative) and *vedna-shotha hara* (anti-inflmmatory and analgesic) properties. The patient was advised *Sanshamani Vati* (*Guduchi ghana Vati*) 500 mg twice a day. *Guduchi* (*Tinospora cordifolia* (Willd.) Hook. f.) has *Rasayana, Balya, Agnidipana and, Tridoshshamaka* activity [19]. *Sitophaladi churna* 2 g mixed with 125 mg of *Godanti bhasma* was advised to be taken twice a day with lukewarm water. *Godanti bhasma* has *Madhur Vipaka* and *Sheeta veerya* [20]. On the second day of treatment, intensity of headache increased for which she was given a paste of *Haridra* (*Curcuma longa* Linn) with water as base for local application on forehead, twice a day. This was continued for three days. Later, the treatment was revised and *Phala ghrita* was advised (5 g), twice a day on the 4th day of admission. The dietary interventions included gruel and vegetable soup along with regular diet. On remission of fever, lifestyle intervention was advised which included *Pranayam* (breathing exercises, *Anuloma – villoma*) which helps alleviate functional capacity of lungs, *Tadasana* (Mountain Pose) and *Shavasana* (Corpse pose). Yoga has been found to improve respiratory efficiency [21]. Effect of Yoga has been evaluated on the maternal experience during pregnancy, in labour, and on birth outcomes and it was found beneficial [22].

8. Follow-up and outcomes

The severity of the symptoms gradually decreased on day 2 of admission (Fig. 1) and majority of the symptoms were relieved on 6th day of treatment. On 3rd September, 2020 PCR assay for the throat swab sample was done using a SARS-CoV-2 real-time RT-PCR kit, which was negative. She was discharged from hospital on 5th September, 2020 and was advised restorative care which included Tablet *Sanshamani Vati* 500 mg, twice a day for 7 days. No adverse outcome was observed related to the intervention during the course of treatment and in the follow-up period.

The patient was followed up via telemedicine virtual visits after discharge as she shifted back to her hometown in Bihar. Maternal, obstetric, and neonatal outcomes were assessed during the course. The patient had a normal course of pregnancy in the second and third trimester and no complications were reported. At the gestational age of 37 weeks + 1 day, she developed mild pain in abdomen with mild bleeding with mucous per vaginum on 12th January, 2020. She took trial of labour in nearby CHC for 2 days where she was diagnosed with obstructed labour and thus was referred for institutional delivery and there-on admission, emergency LSCS was planned and the indication was obstructed labour. A male child was delivered on 14th January, 2020 weighing 2.7 kg and APGAR score was 9 at 5 min. A cohort study found SARS-CoV-2 infection during pregnancy is not associated with adverse pregnancy outcomes [23]. Another study found an association of infection with iatrogenic pre-term birth and caesarean section delivery [24].

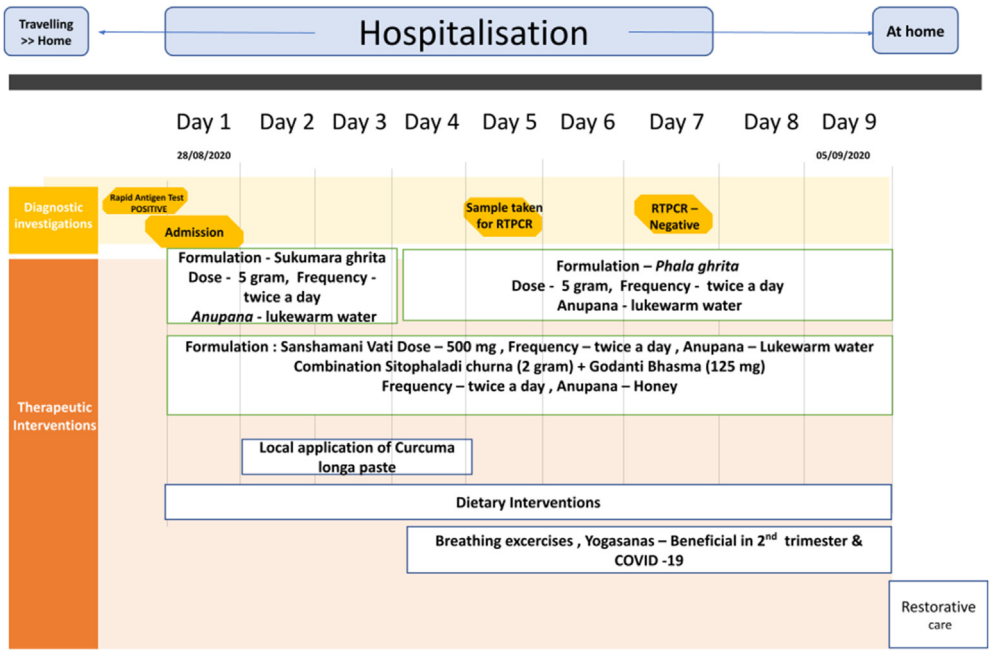

Fig. 3. Timeline of interventions in the case.

9. Discussion

Acharya Kashyapa has stated that fever in a pregnant woman is the most troublesome disease as the foetus suffers due to the transfer of heat of fever from the mother to the foetus [25]. This case demonstrated Ayurvedic management for pregnant woman with COVID-19 disease. The safety and efficacy were the initial concerns in considering the mentioned therapeutics. The intervention included oral medications, and, dietary and lifestyle interventions. The initial treatment on admission was administered as *vyadhi-viprita upkrama* (*jwaraghna* action of *Sanshamani Vati* and *Godanti bhasma*) and *Sukumar ghrita* was administered for its *Vatanashan karma* and *rasayana* action. Efficacy of *Sanshamani Vati* in the treatment of moderate infection of COVID-19 is evident through the recent studies [26,27]. Antipyretic effect of this formulation has been observed in experimental and clinical studies [28–30]. In an experimental study, it was also found to induce translocation of the LC3 protein from the nucleus to the vacuolar membrane by immune-cytochemistry, indicating LC3-associated phagocytosis (LAP)-like function, playing an important role during immunity to infectious agents including viruses [31,32]. It has been evaluated for its toxicity, anti-ulcer and antipyretic activity in experimental animals [33]. *Godanti bhasma* contains 42.3% calcium as calcium oxide when analyzed by gravimetric method [34]. This lies within normal recommended dose of calcium in pregnant woman.

This case report has few limitations including a retrospective design, descriptive in nature, and lack of ability to generalize. Moreover, this is a case-specific management and authors do not claim to standardise this treatment in every ante-natal case diagnosed with COVID-19 disease.

It has been concluded in a systematic review that evidence pertaining to COVID-19 in pregnancy is limited on grounds of pathology and interventions [35]. The trials are ongoing but the majority of information has come from preliminary forms of evidence like case series and case studies.

10. Conclusion

In the current situation, this reported case of Ayurvedic management of COVID-19 during pregnancy provides novel information. This is a preliminary type of evidence and this approach may encourage the clinicians to manage even the vulnerable groups of population purely with the interventions of Ayurveda. The primary objective in managing any ante-natal case is to accomplish a healthy progeny devoid of any feto-maternal complications, which was achieved here, through the holistic care principles of Ayurveda.

Patient perspective

The patient was satisfied with the improvement in illness. She willing adopted each and every recommendations and followed the same throughout the course of her pregnancy.

Informed consent

The authors certify that they have obtained patient consent form, where the patient has given her consent for reporting the case. The patient understands that her name and initials will not be published and due efforts will be made to conceal her identity, but anonymity cannot be guaranteed.

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Conflict of interest

None.

Author contributions

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References

[1] Sutton D, Fuchs K, D'Alton M, Goffman D. Universal screening for SARS-CoV-2 in women admitted for delivery. N Engl J Med 2020 May 28;382(22):2163–4. https://doi.org/10.1056/NEJMc2009316. Published online April 13.
[2] Campbell KH, Tornatore JM, Lawrence KE, Illuzzi JL, Sussman LS, Lipkind HS, et al. Prevalence of SARS-CoV-2 among patients admitted for childbirth in southern Connecticut. J Am Med Assoc 2020;323(24):2520–2.
[3] Goldfarb I, Diouf K, Barth W, Robinson J, Katz D, Gregory K, et al. Universal SARS-CoV-2 testing on admission to the labor and delivery unit: low prevalence among asymptomatic obstetric patients. Infect Contr Hosp Epidemiol 2020;41(9):1095–6.
[4] https://www.who.int/news-room/feature-stories/detail/who-africa-cdc-push-for-covid-19-traditional-medicine-research-in-africa.
[5] Ogoina D. Fever, fever patterns and diseases called 'fever'–a review. J Infect Public Health 2011;4(3):108–24.
[6] McCormack HM, Horne DJ, Sheather S. Clinical applications of visual analogue scales: a critical review. Psychol Med 1988;18:1007–19.
[7] Stenton C. The MRC breathlessness scale. Occup Med 2008;58(3):226–7.
[8] Kajal K, Dharmu D, Bhukkal I, Yaddanapudi S, Soni SL, Kumar M, et al. Comparison of three different methods of attenuating postoperative sore throat, cough, and hoarseness of voice in patients undergoing tracheal intubation. Anesth Essays Res 2019;13(3):572–6.
[9] Lai K, Shen H, Zhou X, Qiu Z, Cai S, Wang Q, et al. Clinical practice guidelines for diagnosis and management of cough-Chinese thoracic society (CTS) asthma consortium. J Thorac Dis 2018;10(11):6314–51.
[10] Patel MV, Patel KB, Gupta SN. Ayurvedic management of primary nephrotic syndrome. J Res Educ Indian Med July 2015. https://doi.org/10.5455/JREIM.82-1422092361. ISSN 0970–7700.
[11] Spazzapan S, Bearz A, Tirelli U. Fatigue in cancer patients receiving chemotherapy: an analysis of published studies. Ann Oncol 2004 Oct;15(10):1576.
[12] https://www.mohfw.gov.in/pdf/UpdatedClinicalManagementProtocolforCOVID19dated03072020.pdf. visited on November 9, 2020 at 6 pm.
[13] Ge H, Wang X, Yuan X, Xiao G, Wang C, Deng T, et al. Eur J Clin Microbiol Infect Dis 2020 Jun;39(6):1011–9.
[14] Pandkar Prasad, Sachdeva Vinay. Pathophysiology of COVID-19 and host centric approaches of Ayurveda. J Ayurveda Integr Med 2020. https://doi.org/10.1016/j.jaim.2020.11.010.
[15] Vaidya yadavji Trikamji Acharya Charaksamhita of chakrapanidatta; sutrasthan; mahachatushpadadhyay; chapter 10, verses 15.(reprinted.). Varanasi: Choukhambha Orientalia; 200476 e50.
[16] https://www.mohfw.gov.in/pdf/UpdatedClinicalManagementProtocolforCOVID19dated03072020.pdf. assessed on November , 2020 at 8:15 pm.
[17] Vaidya Yadavji Trikamji Acharya Charaksamhita of chakrapanidatta; sharirsthan; jatisutriya adhyay; chapter 8, verses 22 (Reprinted.). Varanasi: Choukhambha Orientalia; 2004. p. 153e50.
[18] Tripathi B, editor. Ashtanga hridaya of Vagbhata, chikitsa Sansthana; chikitsa Sansthana. Varanasi: Choukshambha Sanskrit Pratishthan; 2011. p. 782 [Chapter 13], Verse 41 – 47.
[19] Chunekar KC, Pandey GS. Guduchyadi Varga. Bhavprakash Nidhantu. Varanasi: Chaukhambha Bharati Academy; 2006. p. 269.
[20] Acharya YT, editor.Rasamritam, ed. Translated by Dr. Joshi D. Varanasi: Chaukamba Sanskrit Bhavan; vol. 315.p.118.
[21] Behera M, Priyadarsini N, Mohapatra D, Mishra T, Aparajita Behera A. Role of yoga in study of pulmonary function test in young healthy adults [Internet] Int J Med Res Rev 2016;4(6):872–5 [cited 2021Jan.22].

[22] Curtis K, Weinrib A, Katz J. Systematic review of yoga for pregnant women: current status and future directions. Evid Based Complement Alternat Med 2012;2012:715942. https://doi.org/10.1155/2012/715942.
[23] Adhikari EH, Moreno W, Zofkie AC, MacDonald L, McIntire DD, Collins RRJ, et al. Pregnancy outcomes among women with and without severe acute respiratory syndrome coronavirus 2 infection. JAMA Netw Open 2020;3(11).
[24] Yang R, Mei H, Zheng T, Fu Q, Zhang Y, Buka S, et al. Pregnant women with COVID-19 and risk of adverse birth outcomes and maternal-fetal vertical transmission: a population-based cohort study in Wuhan, China. BMC Med 2020;18:330.
[25] Aacharya Vruddha Jivaka, Kashyapa Samhita, Khila Sthana, Antarvartniadhyaya -chapter 10 verse 4 , by P V Tewari, reprint 2008 By Chokhambha Vishvabharti, Varanasi;p 553 e 558.
[26] Rais A, Kumar T, Yadav A, Negi DS. Management of a mild COVID-19 infection through Ayurvedic intervention: a case report. J Ayurveda Case Rep 2020;3:91–4.
[27] Kumar A, Prasad G, Srivastav S, Gautam VK, Sharma N. A retrospective study on efficacy and safety of Guduchi GhanVati for Covid-19 asymptomatic patients. medRxiv 2020. https://doi.org/10.1101/2020.07.23.20160424. 07.23.20160424; (online preprint).
[28] Alsuhaibani S, Khan MA. Immune-stimulatory and therapeutic activity of tinospora cordifolia: double-edged sword against salmonellosis. J Immunol Res 2017;2017:1787803.
[29] Patgiri B, Umretia BL, Vaishnav PU, Prajapati PK, Shukla VJ, Ravishankar B. Anti-inflammatory activity of guduchi Ghana (aqueous extract of tinospora cordifolia Miers.). Ayu 2014;35(1):108–10.
[30] Hussain L, Akash MS, Ain NU, Rehman K, Ibrahim M. The analgesic, anti-inflammatory and anti-pyretic activities of tinospora cordifolia. Adv Clin Exp Med 2015;24(6):957–64.
[31] Das SK, Joshi A, Bisht L, Das N, Balkrishna A, Dhara S. Godanti Bhasma (anhydrous $CaSO_4$) induces massive cytoplasmic vacuolation and cell survival response through stimulation of LC3 Associated Phagocytosis (LAP). bioRxiv 2020. https://doi.org/10.1101/2020.02.01.930594. 02.01.930594.
[32] Balkrishna A, Das SK, Joshi A, Sharma V, Bisht L, Das N, et al. Cellular internalization of Godanti Bhasma (anhydrous $CaSO_4$) induces massive cytoplasmic reversible vacuolation and survival response of mammalian cells. bioRxiv 2020. https://doi.org/10.1101/2020.02.01.930594. 02.01.930594.
[33] Dubey Nidhi, Mehta RS, Sharma Praveen, Ghule Santosh, Bhowmick Mithun. Toxicological and pharmacological assessment of Godanti bhasma. Asian J Chem 2012;24:4653–6.
[34] Thakkar Rohit, Baghel Dileep, Singh Saurabh. Physicochemical screening of Godanti bhasma : an effort to pharmaceutical standardisation. J Pharm Res 2017;1111:887–94.
[35] Pastick Katelyn A, Nicol Melanie R, Smyth Elizabeth, Zash Rebecca, Boulware David R, Rajasingham Radha, et al. A systematic review of treatment and outcomes of pregnant women with COVID-19—a call for clinical trials. Open Forum Infectious Diseases 2020;7(9). ofaa350.