

Iyya Irumal (Identical to COVID - 19) ---Its Pathological Aspects and Management Theories in Siddha

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Abstract: Corona viruses have been causing problems to the humanity for a long time. Corona Virus Infectious Disease 2019 (COVID-19), caused by the severe acute respiratory syndrome corona virus 2 (SARS-CoV-2) has developed into a pandemic since it was first identified in Wuhan, China. In this regard, a plenty of research works in traditional medicines are conducted around the world in the search for potential treatments for COVID-19. Siddha system of medicine is one of the Indian traditional medicines have wide potential for usage in such conditions owing to their longstanding use in the community (predominantly in South India), ancient references and clinical efficacy. The majority of people who contract Covid-19 suffer only mild respiratory symptoms like cough, cold, difficulty in breathing, etc. So, it is important to elaborate the disease Iyya Irumal (Irumal – one of the respiratory diseases in Siddha) mentioned in the Siddha literature to get a better insight and valid explanation. This article briefly postulates how far Siddha medicines work in COVID-19 is critically analysed with Iyya Irumal with its etio-pathogenesis, prevention and management aspects including the validation of the Siddha literature.

Keywords: COVID-19, Corona virus, Iyya Irumal, SARS-CoV-2, Siddha medicine, Traditional Medicine

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I. Introduction

In 2002-2003, more than 8000 patients suffered from Severe Acute Respiratory Syndrome (SARS) due to a coronavirus, with 774 deaths and on September 2012, 2494 patients suffered with Middle East Respiratory Syndrome Coronavirus (MERS-CoV), with 858 deaths reported to WHO.[1,2] The current 2019-nCoV outbreak is moving rapidly [3]-- the cumulative number of confirmed cases all around the world 1 6,14 951 confirmed cases , 99 887 confirmed deaths and 213 Countries were affected and in India has reached 7367 , with 715 cured cases and 273 deaths as on 12th April 2020 .[4]On the basis levels of spread and severity the Director-General of WHO characterized the COVID-19 situation as a pandemic, on March 11, 2020 [5]. *Iyya Irumal* mentioned in the Siddha literatures is identical to Sars-CoV-2 in all aspects.

Siddha medicine is one of the oldest systems of medicine developed by Siddhars. [6] Siddhars through their extraordinary perception and vision have understood the science of disease mechanism and management, etc. They have explained those experiences in Tamil, in the form of poems or verses in various literatures. In Siddha system of medicine Siddhar Agasthiyar identified 4448 diseases. [7] Any derangement in three humors (*Vatham, Pitham, Kabam*) results in development of 4448 diseases.

Siddha medicine has a long history and also played an indispensable role in the prevention and treatment of several epidemic diseases. During the Dengue outbreak in 2013, the intervention of Siddha has achieved a remarkable therapeutic effect [8]. However, Siddha medicine will play a significant role in the treatment of COVID-19, bringing new hope for the prevention and control of COVID-19 with its probable treatment modalities.

II. Analogy between COVID-19 and Iyya Irumal

Siddhar Yugi classified all types of respiratory syndromes under *Irumal, Iraippu* and *Ilaippu*. One among them *Iyya Irumal* is explained under classification of *Irumal Noi* [9] which is closely resembles to the SARS COV-2.

Siddha text describes the symptoms of *Iyya Irumal* as running nose, sore throat, chest pain when breathing or coughing, Coughing up sputum or thick phlegm from the lungs, shortness of breath, abdominal discomfort, fever, impairments of brain like altered mental status, fatigue, nausea or vomiting and bone or joint pain [10]. These symptoms described by the above mentioned text correlates with the definition of SARS-CoV-2 by WHO.

III. Naadi- The Siddha diagnostic tool for *Irumal* diseases

Irumal disease is mainly due to aggravation of *Kabam* and *Vatham* along with *Pitham* which are evident from the following:

Table 1: The Siddha diagnostic tool (Naadi) for *Irumal* diseases [11]

S. No	Poetry Lines	Naadi (Altered Humour)	Indicated Disease	Reference
1	"...Saeththumanthaa nilagil...eelai irumal..kaasam..."	Kabam	<i>Irumal, Kaasam</i>	<i>Sathaga Naadi</i>
2	"...Silaetuma mandham patril...kozhai..."	Kabam	<i>Kozhai</i>	<i>Gunavaagada Naadi</i>
3	"Iyyame kathiththapo thariyave...kaasam..."	Kabam	<i>Kaasam, Irumal</i>	<i>Pathinen Siththar Naadi</i>
4	"...vathaththir saeththuma naadi...theengaana irumal..."	Kabam & Vatham	<i>Irumal</i>	<i>Sathaga Naadi</i>
5	"...Saeththuma meeril...irumal..."	Kabam	<i>Irumal</i>	<i>Agathiyar Naadi</i>
6	"...saeththumathil piththa naadi...irumal..."	Kabam & Pitham	<i>Irumal</i>	<i>Sathaga Naadi</i>
7	"...Kabaththinale yandri kaasa suvasam kaanathu ..."	Kabam	<i>Kaasam, Swaasam</i>	<i>Thaeraiyar</i>

The above verses explain that the derangement of *Iyyam* or *Kabam* humour is the basic reason to cause *Irumal noi*. Also association of *Kabam* with *Vatham* and *Pitham* may lead to the severity of this disease. In this *Irumal* diseases, one of the constituents of *Vatham* namely *Uthana vaayu* (Responsible for all kinds of upward motion such as nausea, vomiting, etc...) was increases from its normal state along with the deranged *Kabam* humour.

Secretion of lubricating material, cold and fatigue are some of the properties of *Iyyam* humour. When the *Iyyam* humour is vitiated, mucosa of the respiratory passage is affected and it causes the inflammation of the throat, nose, lungs, etc. Slowly the inflammation is increased and produces a lot of mucosal secretion which leads to difficulty in breathing and cough.

IV. Analysis of aetiology explained in ancient siddha literatures with modern researches in COVID-19

The causative factors of *Irumal* diseases are explained by Siddhar Yugi [9]

<p><i>Noi Varun Vazhi- Yugi Vaithiya Chindhamani</i> "Vaekindra vathigamam pugaiyinaalum Meerukindra baanaththal mikundhthaanay Paathaththal paramaakini migukkai yaalum Paramaa maamisangal pusikkai yaalum Thaaththar sanjaarandh thavirkai yaalum Saripadap patharthangal pusiththa laalum Theenaththaar pusiyaama lirukkai yaalum Saeyizhaiyaar melinbamnggh sidhaivathaalum Maanaththal maathukka madatha thaalum Madhaththaalung suvasamathu maruvungkaanae"</p>
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Table 2: Aetiology of *Iyya Irumal* in relation with COVID-19

As per Siddha literature view	As per the view of modern medical researchers
<i>Kulir kaatril eedupadal</i> - Exposure to cold [10]	A study suggests, every 1°C increase in the average temperature (AT) and relative humidity (ARH) led to a decrease in the daily confirmed cases. A significant interaction between temperature and humidity existed.[12]
<i>Paramaakini migukkai yaalum</i> -Due to heat [10]	Viruses will adapt to live in higher temperatures. Climate change could alter the relationship between our body's defences and pathogens. These modifications could include the adaptation of microbes to a warming world, changes in viruses to interact with a weakened human immune response. [13]
<i>Migundha pugaiyil eedupadathathaalum, puzhuthi ,pugai, nan manam, theemanam</i>	China where the COVID-19 epidemic is started, also a country severely affected by air pollution. Several models predict mortality due to air pollution [14] The patients

<p><i>aagiyavatrai mugarvathaalu</i> -Exposure to excessive dust, irritants such as smoke, fumes, dirt air [10]</p>	<p>with SARS were more than twice as likely to die from the disease if they came from areas of high pollution [15]. Exposure to common air pollutants can alter host immunity to respiratory viral infections which enhance susceptibility to more serious implications for individuals with pre-existing pulmonary conditions, such as asthma and COPD.[16]</p>
<p><i>Kari, meen mudhaliyavaigalaal</i> - Due to animal flesh and foods that improperly cooked [10]</p>	<p>In late December 2019, an outbreak of a mysterious pneumonia happened in a seafood wholesale wet market, the Huanan Seafood Wholesale Market, in Wuhan, Hubei, China [17] Theoretically, if people contact or eat the reservoir or infected animal, they could be infected. Initially, the 2019-CoV outbreak was reported as limited person-to-person transmission and a contaminated source from infected or sick wild animals in the wet market may have been the common origin [17,18]</p>
<p><i>Innoiyutror thindra pandangalai pusipathaalum varum</i> Eat diseased one's food [10]</p>	<p>Recent studies have shown that SARS-CoV-2 may remain infectious on surfaces or objects for up to 72 hours, but most virus on the surface of common materials becomes inactive (non-infectious) after the first 24 hours. There is limited evidence that virus particles on those products transmit disease [19] Although COVID-19 genetic material (RNA) has been isolated from stool samples of infected patients,[20] there may be faecal-oral transmission</p>
<p><i>Thanvandri vaidhyam says</i> "Arasaroo ganthanakkay yamaichcharai kaasa rogam Tharamisai maandhar thammai saarndhidum vagaiyo thanni Lurumisai silaesandh thangu muruthuya raalu maathar Tharumayalaalundh thoomang saarthugal mugarththalam" -Frequently inhale of smoke and dust [21]</p>	<p>Already discussed in above[14,15,16]</p>
<p>"saeizhaiyaarmel inbam....swaasamathu maruvung..."[10] "...kaasarogam...maathar tharumayalaalundh..."[21] -Sexual indulgence</p>	<p>A study found that SARS-CoV-2 can be present in the semen of patients with COVID-19 and may still be detected in the semen of recovering patients. For this, it could be proved that SARS-CoV-2 can be transmitted sexually [22]</p>
<p>In the text Para Rasasekaram, the following are described [23] "Pugaimigak kudithalaalum.....kaasanoivandh thurumena uraiththiteeray" -Excessive smoking</p>	<p>The smokers were 1.4 times more likely to have severe symptoms of COVID-19 and approximately 2.4 times more likely to be admitted to an ICU, need mechanical ventilation or die compared to non-smokers. [24]</p>

These are the conclusions of cause of the disease is very clear with presenting causes in the research up to date regarding COVID-19.

V. Stages of COVID - 19 symptoms - Symptomatic comparison with Siddha

The most detailed breakdown of symptoms of the disease comes from a recent World Health Organization analysis of more than 55,000 confirmed cases in China. Here are the most common symptoms and the percentage of people who had them: [25]

- Fever: 88%
- Dry cough: 68%
- Fatigue: 38%
- Coughing up sputum, or thick phlegm, from the lungs: 33%
- Shortness of breath: 19%
- Bone or joint pain: 15%
- Sore throat: 14%
- Headache: 14%
- Chills: 11%
- Nausea or vomiting: 5%
- Stuffy nose: 5%
- Diarrhoea: 4%
- Coughing up blood: 1%
- Swollen eyes: 1%

COVID-19 from China showed that illness severity can range from mild to critical [26]

1. Mild to moderate (mild symptoms up to mild pneumonia)
2. Severe (dyspnoea, hypoxia, or >50% lung involvement on imaging)
3. Critical (respiratory failure, shock, or multi-organ system dysfunction)

In Siddha literature *Yugi vaithiya chindhamani* poem says,

IYYA IRUMAL
 “Saatravay irumalodu ilappu mundaai
 Saarnthapee laimoochchu migunthu vaangum
 Aatravay adivayiru mandham patri
 Azhagaagu muruvazhiithu udambu vattrum
 Saetravae suramuodu thiyakka mundaai
 Siihdhaamay migakkalangi vaanthi yaagi
 Theetravay sirukaduppar thaega mengunng
 Siletumaththin kaasamendrae seppa laamay” -Yugi muni [9]

Stage -0 ---- “sub-clinical”- one who have the virus but have no symptoms. Patients with no symptoms or a positive travel history / contact history/ home quarantine / isolation

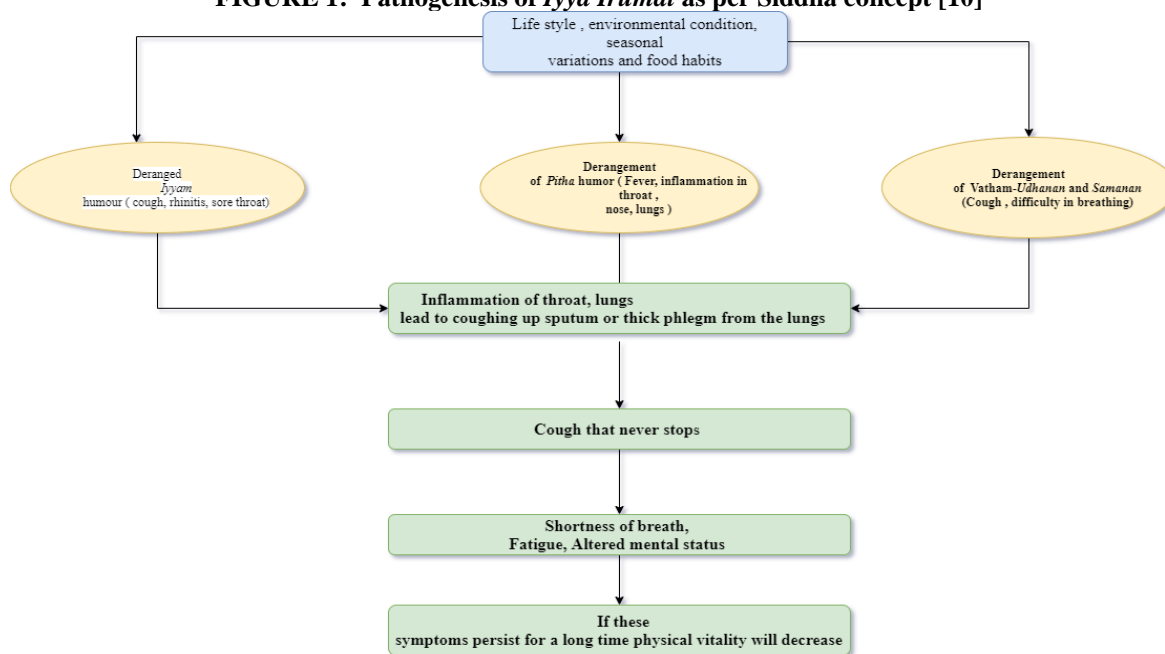
Table 3: Breakup symptoms of *Iyya Irumal* (COVID-19)

Stages	Symptoms as per Siddha literature	Symptoms based on covid-19 research studies
MILD (uncomplicated) Early symptoms are	-Running nose (<i>Mookuneer vadithal</i>) [10]	-Runny Nose [25]
	-Sore throat (<i>Thondai punnathal</i>) [10]	-Sore Throat[25]
	-Fever(<i>suram varuthal</i>) [10]	-Fever, Tiredness[25]
	-Dry cough(<i>Adikadi irumudhal</i>) [10]	-Dry Cough [25]
	-Thick yellow discharge from eye which indicates conjunctivitis (<i>Saarntha peelaiodu</i>) [10]	-Conjunctivitis was present in 12 (32%) and it was most evident and severe in the sickest patients. [27]
	-Gastrointestinal problems (<i>Adikadi irumuvathal adivayiru nothal,vayittril kaatru niraindhuthiruththal pol oru vidha thunbam aepaduthal</i>) -Vomiting (<i>Undavai vaandhiyaathal</i>) [10]	-Just under half (48.5%) of the COVID-19 patients in the Chinese province came to the hospital have gastrointestinal manifestations with diarrhoea, vomiting and abdominal pain [28, 29].SARS-CoV-2 infection routes is still limited. The virus can proliferate in the digestive tract and potentially undergo faecal-oral transmission.[30]
In Dhanvadri vaithyam text the following described as, -Skin problem like Itching (<i>Seeriya silethumakasang.....thinavu mundang....</i>) [21]	-The cutaneous manifestations in COVID-19 patients were erythematous rash, widespread urticarial and chickenpox-like vesicles. [31]	
-Loss of sense of taste (Ageusia) (<i>Seeriya silethumakasang...Arusi vaainee rozhikidu....</i>) [21]	Alterations in smell or taste were frequently reported by mildly symptomatic patients with SARS-CoV-2 infection and often were the first apparent symptom. [32]	
Severe pneumonia	-Chest pain when breathing or coughing (<i>Maarbu nondhu pin irumalai undakum</i>) [10]	Persistent pain or pressure in the chest[33]
	-Dyspnoea (<i>eppozhuthum perumoocherithal</i>) -Coughing up sputum, or thick phlegm, from the lungs (<i>Irumal vaay ooyathu aduthaduththu varungaal, kozhai vaeluththu seezhai pol mikka naatrathudan veliyaagum</i>) [10]	Trouble breathing[33] Shortness of breath or difficulty breathing[33]
End stage	-Patients exhibit altered mental status (<i>Thiyakkam, innoi theerumo theerathao vennum manakalakkam piraththal,siththamae ,iga kalangi pothal</i>) [10] <i>Thiyakkam-giddiness</i> , confusion of mind, swoon [73]	-Patients with severe infection were more likely to develop neurologic manifestations, especially acute cerebrovascular disease, conscious disturbance, and skeletal muscle injury. [34]
	-Body ache (<i>Udal muzhuvathum valithal</i>) [10]	This injury could be associated with ACE2 in skeletal muscle. Their clinical conditions may worsen, and patients may die sooner. Neurologic injury has been confirmed in the infection of other CoVs such as in SARS-CoV and MERS-CoV. The researchers detected SARSCoV nucleic acid in the cerebrospinal fluid of those patients and also in their brain tissue on autopsy.[34]

VI. Pathogenesis of COVID-19-Iyya Irumal

The main pathogenesis of COVID-19 infection as a respiratory system targeting virus was severe pneumonia combined with the incidence of acute cardiac injury. Significantly high blood levels of cytokines and chemokines were noted [35]

FIGURE 1: Pathogenesis of *Iyya Irumal* as per Siddha concept [10]



VII. Line of Treatment Advocated as Per The Siddha Principles with Scientific Validation [10]

Every Siddha drug is administered with a unique line of treatment. This is done to pacify the deranged humour. Initially a purgative, therapeutic vomiting or a combination of both may be used to normalize the deranged *Kabam* and *Vatham*. The significance of giving such a therapy before administering the main drug is to remove excess of phlegm from the respiratory tract.

For this any one of the following medicines can be used:

- *Sanjeevi maathirai*
- *Korosanai karuppu- Korosanai* (Purified bile of *Bos indicus*)

In traditional practise it is used for respiratory diseases cold, fever and cough. *Korosanai* is obtained from the stomach of a cow. It acts as an antidote to poisons and alleviates fevers and contagious diseases. [36] As with other respiratory viruses, SARS-COV-2 may enter the CNS through the haematogenous or retrograde neuronal route turns out to be a brain-invader. [37] For this medicine, we use to treat an infection have different penetrations into the central nervous system. Most drugs can't pass through the blood-brain barrier.

- *Uththamani thylam (Maantha thylam)*

Uththamani (Pergularia daemia Linn.)- Anti-viral activity (Anti-corona virus/ mouse corona virus (MCV, the surrogate for human SARS virus) [38]

For the purpose of Siddha interventions during COVID-19 pandemic, people can be segregated into these five distinct categories.

Table 4: Management of *Iyya Irumal* with the respective of its stages

Stages of the disease	Management in Siddha [10]	Scientific validation
Stage -0 [Exposed asymptomatic (Quarantined)]	To prevent the progression of pathogenesis initially, <i>Kabasura kudineer</i> is one of the drug of choice. Since this preparation is recently promoted as a prophylaxis for COVID-19 in South India.	These ingredients are proposed for the reason that these are known to be Anti-inflammatory, antivirals, Antitussive, Antioxidant, Immunomodulatory activity, Anti-pyretic effect, Hepato-protective activity, Anti-malarial activity.[39]
Mild to moderate illness -Running nose -Sneezing -Sore throat -Fever	<i>Thumbai poo</i> (flower of <i>Leucas aspera</i> (Willd.) Linn.) - 1 <i>varagan</i> (4.2 g) <i>Milagu</i> (<i>Piper nigrum</i> Linn.) - ½ <i>varagan</i> (2.1 g) Preparation: Grind both the drugs along with honey and make it into four parts--each one part for morning and evening. Repeat this until symptoms disappear. Fumigation- Grind the leaves of <i>Leucas aspera</i> and make it in the form of juice which is spread over a piece of cloth. The cloth is rolled into a stick and it	<i>Thumbai</i> –Anti-viral activity (Anti-corona virus, Anti-HSV) – Antimicrobial activity [40] -Flowers are valued as stimulant, cytotoxic activity, expectorant and anti-oxidant [41] -Thrombolytic activity [42] <i>Milagu</i> (<i>Piper nigrum</i> Linn.) -Immuno-modulatory activity[43] -Anti-inflammatory [43] - bio-availability enhancer [43]

Persistent cough	is allowed to burn. The smoke coming from this stick is made to be inhaled by the patient through the nose and exhaled by the mouth. If the smoke is inhaled through mouth and exhaled through the nose it will cause head related diseases. The sputum is properly expelled and no congestion is felt. <i>Kasthuri karuppu-1 kundri(130 mg) and Pavazha parpam - 1 kundri (130 mg) along with kandangathiri lehyam</i>	<i>Kasthuri</i> (<i>Moschus moschiferus</i> musk) -Natural musk may inhibit the microbes via preventing the synthesis of nucleic acids causing construction of abnormal proteins. [44]
Severe pneumonia -Coughing up sputum or thick phlegm, from the lungs	<i>Thaalaga parpam – 1 kunri (130 mg) and Muthithu parpam - 1 kunri (130 mg) along with thumbai chaaru and honey twice in a day</i>	<i>Thaalagam</i> -Arsenic trioxide is now becoming a very promising chemotherapeutic agent in western medicine to treat Acute Pro-myelocytic Leukaemia (APL) and possibly other malignancies [45]. Whether it may quell the excessive immune response Covid-19 triggers in some patients and can block the inflammatory response.
End stage -Acute Respiratory Distress Syndrome (ARDS), -Sepsis, Septic Shock	<i>Sembu parpam- 1 arisi (65 mg) and Punugu(Viverra civetta)-1 kunri (130 mg) twice a day along with uththamani chaaru (Pergularia daemia Linn.)</i>	<i>Sembu</i> (Copper) -Wide-spectrum antiviral activity. Copper ions inactivate HIV-1 protease, which is an essential protein for viral replication.[46]

These Siddha drugs which were prescribed in clinical practice, proved their excellence in therapeutic field for the above symptoms.

Table 5: Drugs as mentioned below for their therapeutic use in Siddha literature

<i>Thippli</i> (<i>Piper longum</i> Linn.)	<i>Thaalapathiri</i> (<i>Taxus baccata</i> Linn.)
<i>Milagu</i> (<i>Piper nigrum</i> Linn.)	<i>Chukku</i> (<i>Zingiber officinale</i> Linn.)
<i>Lavangam</i> (<i>Syzygium aromaticum</i> (L.) Merr. et Perry)	<i>Athimathuram</i> (<i>Glycyrrhiza glabra</i> Linn.)
<i>Siru thaekku</i> (<i>Clerodendrum infortunatum</i> Linn.)	<i>Chittrathai</i> (<i>Alpinia officinarum</i> Hance)
<i>Paeraraththai</i> (<i>Alpinia galangal</i> Wild)	<i>Akkragaaram</i> (<i>Anacyclus pyrethrum</i> (L.) Lag.)
<i>Koshtam</i> (<i>Costus speciosus</i> Linn.)	<i>Kungumappoo</i> (<i>Crocus sativus</i> Linn.)
<i>Pachchai karpooram</i> (<i>Dryobalanops aromatica</i> Gaertn. f.)	<i>Karpooram</i> (<i>Cinnamom camphora</i> Linn.)
<i>Kasthuri</i> (<i>Moschus moschiferus</i> musk)	
<i>Thulasi</i> (<i>Ocimum sanctum</i> Linn.)	<i>Kanjangorai</i> (<i>Ocimum album</i> Linn.)
<i>Thumbai</i> (<i>Lucas aspera</i> (Willd.) Linn.)	<i>Aadathodai</i> (<i>Justicia adathoda</i> Linn.)
<i>Uththamani</i> (<i>Pergularia daemia</i> Linn.)	<i>Kandangathiri</i> (<i>Solanum surattense</i> , Burm.f)

In addition to the above drugs, formulations of metals and minerals such as gold, silver, copper, iron, zinc, mercury are apparently used in the treatment. Minerals are combined with herbs that assist the assimilation and delivery of the ingredients to the human body. Most of the medicines are mixture of compounds because of their synergistic action toxicity gets reduced/eliminated, thereby increasing bioavailability through the cells of the body. Treating the minerals with herbal juices may lead to reduction in particulate size even up to Nano levels (less than 100 nm) that enables increase its potency. [47]

- *Vasantha kusumagaram*
- *Maga vasantha kusumagaram*- A herbo-mineral drug which contains gold, iron, copper etc.
-Gold/copper sulphide (Au/CuS) core can rapidly inactivate human norovirus [48]
-Significance of Iron oxide nanoparticles as the potent influenza virus inhibitor [49]
- *Poorana chandhrothayam* – It is a mercurial preparation with gold and sulphur.
-Gold nanoparticles have shown that they inhibit the viral entry by binding with gp120 and prevent CD4 attachment. [50]
-Sulphur-containing purine nucleoside analogues: 6MP, 6-thioinosine, 6-methylthioinosine and 6-ethylthioinosine, were examined for antiviral activity and they extensively inhibited the replication of influenza viruses. [51]
- *Thaalaga parpam*
- *Pavazha parpam* – Calcium [52]
- *Palagarai parpam* – Calcium carbonate, Magnesium, Phosphorus [53]
- *Chippi parpam* -The crystals of calcium carbonate, Phosphate and Sulphate of Calcium and Magnesium present in the shell [54]

The main ingredients of above Parpams contain, *Pavalam*- *Corallium rubrum* Linn.- red coral, *Palagarai*- *Cypraea moneta* Linn.shell, *Chippi*- *Pictanda fucata* (Pearl oyster shell as they occur in the coastal areas of the sea. As per the above analysis it is concluded that most of marine based Parpams contain

Magnesium, Calcium. Magnesium regulates anti-viral immunity. [55] Mn²⁺ is released from organelles and accumulates in the cytosol upon virus infection, activates anti-viral innate immunity via the cGAS-STING pathway and increases the sensitivity of cGAS to dsDNA and promotes STING activation--- [56]

- *Nathai parpam* - Physico-Chemical Analysis of *Nathai Parpam* shows presence of Zinc .[57] Zinc ions provide a natural protective mechanism against viruses - especially those causing respiratory tract infections.[58] Zinc ions and zinc-ionophores have inhibitory effect on the RNA synthesizing activity of isolated EAV and SARS-CoV.[59]

VIII. External medicines (*Pura marundhugal*) in the treatment for *Iyya Irumal*(COVID-19)

External medicines (*Pura marundhugal*) - for maintaining healthy balance of the three *Uyir thaathukkal* (three vital life factors) and also seven physical constituents (tissues) of the body (*Udarkattukal*)

Table 6: External therapies for *Irumal* diseases

Types of External therapies	Preparations	Mode of Application	Indications
Nasiyam (Nasal Instillation)	-Leaf juice of <i>Notchi</i> (<i>Vitex negundo</i> Linn.) -Leaf juice of <i>Karunthulasi</i> (<i>Ossimum grattissimum</i> Linn.) -Leaf juice of <i>thumbai</i> (<i>Leucas aspera</i> Linn.) Any one of this is used.	Instilled into nostril (Nasal administration-non invasive parenteral route)	Elimination of excess <i>Kabam</i> and chest congestion [60] Cough, Headache, Sinusitis, Eliminating excess <i>Kabam</i> [61]
Otradam (Fomentation)	- <i>Kukkil thylam</i> , <i>Karpoorathai thylam</i> , <i>Karisalai thylam</i> , <i>Nirkundi thylam</i> , <i>Arakku thylam</i> , <i>Chukka thylam</i> , <i>Milagu thylam</i> , <i>Santhanathi thylam</i> Any one of this is used.	Affected area is rubbed with oil in dry skin persons and fomentation is given using <i>Arisi thavidu</i> (fried rice bran)	Chest congestion Common cold [62]
Vedhu (Steaming)	-The leaves of <i>Notchi</i> (<i>Vitex negundo</i> Linn.) are boiled in water and a hot brick piece is poured to develop vapours. -The seeds of <i>Elumichchai</i> (<i>Citrus medica</i> Linn.) or powder of <i>Manjal</i> (<i>Curcuma longa</i> Linn.) is poured in boiled water to generate vapours and inhaled.	The body is covered by a cotton blanket and vapours are inhaled.	Relieves the congestion of mucous membrane in bronchitis and allergic asthma. It expels phlegm from lower respiratory tract and relaxes chest muscles, thus reduces cough.[62]
Pootchu (Liquid poultice)	<i>Karisalai thylam</i> , <i>Nirkundi thylam</i> , <i>Arakku thylam</i> , <i>Ilagu Santhanathi thyalam</i> <i>Mezhugu thylam</i> <i>Vilwaathi thyalam</i>	Externally applied over chest or back	<i>Ilaippu noi</i> [62]
Pottanam (Bundle application)	Equal quantity of Fresh leaves of <i>Sitramutti</i> (<i>Sida cordifolia</i>), <i>Chukku</i> (<i>Zingiber officinale</i>), <i>Chithrarathai</i> (<i>Alpinia officinarum</i> -lesser).Crushed and kept in a cloth bag	Applied on the affected area	To relieve the morbidity of <i>Iyyam</i> [62]
Pugai (Medicated fumigation)	Purified <i>Arithaaram</i> (Yellow arsenic) is ground with the bark and leaf of <i>sarakondrai</i> (<i>Cassia fistula</i>) and water. The fine paste is coated on the cloth and dried, then rolled like a cigar and ignited.	The generated smoke is inhaled	Persistent uncontrolled cough [62]

IX. Cleaning And Disinfection As Per Siddha Scientific View

Instead of using chemical sources and the harmful UV rays for disinfection in living areas, hospitals and laboratories, various Siddha disinfectant methods having defined quality and prepared from easily accessible and affordable sources can be used. Some of these Chemical disinfection procedures explained below utilise derivatives of mercury, alkalis, acids and other products, which are already written in our ancient Siddha literatures.

Table 7: Cleaning and disinfectant in Siddha- A Scientific view

S.NO	CLEANING AND DISINFECTION AS PER SIDDHA	SCIENTIFIC VIEW
1	<i>Veeram</i> (corrosive sublimate /mercuric chloride) - (<i>Kirumi Thotru Neekki/ Keeda Neekki</i> -antiseptic agents): 50 mg of <i>Veeram</i> (Mercuric chloride) is mixed with 250 ml of water and filtered. It is used to external wash .[63]	Mercuric chloride is very commonly used as disinfectant in biological laboratory.[64]
2	<i>Thurusu</i> (Copper sulphate/cupric sulphate)- Antiseptic [63]	Copper: Copper sulphate in a highly organic solution had therefore a marked inhibitory effect upon the growth of the typhoid bacillus.[65]

3	<i>Kaadikaaram</i> (Silver nitrate) – Antiseptic [63]	Silver nitrate: The antimicrobial effect of silver has been demonstrated in numerous and varied applications against many different types of microorganisms including bacteria, viruses, and protozoa. [66].
As per the rules and regulations these disinfectants are currently not in use because of containing heavy metals.		
4	<i>Padikaram, Cheenakarum</i> (Sulphate of alumina / potassium alum/ Ammonium Sulphate) -35 grams of <i>padikaram</i> (Alum) is dissolved in 9 liters and filtered. This water is used to gargle or to wash wounds.[63] -130 mg of <i>padikaram</i> is dissolved in 28 ml of water and used for washing eyes in case of eye Diseases.[63]	Alum: Alum has potential effect on Anti-microbial activity [67]
The Alum (<i>Padigaram</i>) is only used disinfectant as of now in above Siddha medicines.		

Fumigation

Fumigation has been used since ancient times to 'purify the air', also useful for disinfecting objects, clothing, etc. During the epidemic of cattle plague, anthrax fumigation was recommended to control these diseases in 17th and 18th century.[68]

Traditional fumigation with these herbal products is widely used in India. They have the potential to be used as alternative to harmful and toxic conventional chemical fumigation for healthcare environmental disinfection. This involves the artificial impregnation by purification of the environment and sterilizing action on the local or inner areas in the form of medicated smoke.

Environmental disinfection efficiency of traditional fumigation practice has been evaluated by using natural plant products such as Pepper (*Piper nigrum*), Turmeric (*Curcuma longa*) powder, Sandal wood (*Santalum album*), *Seeragam*(*Cuminum cyminum*), Neem (*Azadirachta indica*) and *Sambirani* (resin of *Styrax benzoin*) and *Kungiliyam* (*Shorea robusta*).Fumigation controls the infection up to the deeper areas of the organs.[62]

Disinfection by drying

This method often involved the combined action of heat and ultra-violet radiation obtained by exposure to sunlight. [68]

Kaanthi suttigai (Sun bath)

Kaanthi is defined as an application of adequate exposure of our body to sunlight (Sun bath) - whole body except head to induce perspiration. *Suttigai* means “heat application”. Thus the low amount of heat is received from the sunlight to the body surface. Siddhar Theraiyar states that the evening rays of sun is more beneficial than the morning raise and used to treat some illnesses and to improve the health status.[69] The sunlight provides Vitamin D and it is recognized to act as a major immuno-modulator and its production have consequences for the control of viral infections [70]

Herbal face mask

Grind the turmeric (*Curcuma longa* Linn.) and mix it with water and soak a white cloth in this turmeric water. Then dry it. If we wear this medicated cloth as a face mask, it cures cough, fever and toxic fever. [71]

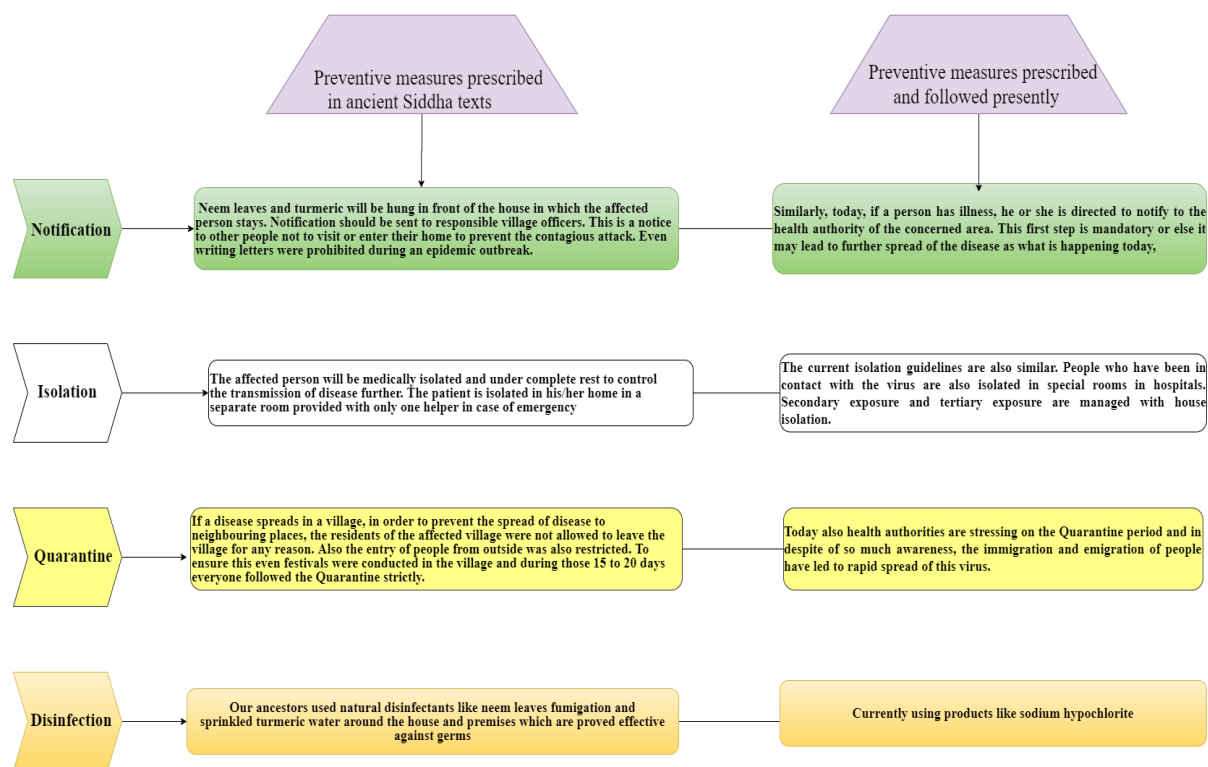
By using disinfectants which are detailed in ancient Siddha literature, we minimize the usage of chemicals or other harmful disinfectants to cleanse the environment.

X. Preventive Measures Against Infectious Diseases Mentioned In Siddha

Literature

In Siddha system of medicine, it's mentioned that during the onset of *Utrayana kalam* from the months of *Thai to Aadi* i.e from February to July, the immunity of human body tends to fluctuate. Siddhars have explained the importance of Diet, Lifestyle and certain season-specific regimen and also preventive measures to be taken to prevent epidemics and their spread. By this we can understand that people living in ancient times were also affected by epidemics and followed the guidelines effectively prescribed to them. [72]

FIGURE 2: The four preventive steps mentioned in Siddha literature [72]



XI. Justification for *Kaba Sura Kudineer* Used In the Treatment of Covid-19--- In Siddha System of Medicine

According to the text *Agathiyar Sura Nool 300*, it is stated by the Siddhar Agathiyar that [10]

- “*Suramathey kabama thaagum*”:

Because of the *Kaba Suram*, the blood flow to the lungs becomes less and it will raise the body temperature and affect the function of the lungs. The expectorant action is affected and it causes loss of body weight and increases the action of *Iyyam*.

- “*Suramathey Iruma laagum*”:

If the *Iyyam* parts of the body (i.e. Above the Neck) become warm at the time of curing stage of the *Iyya Suram*, it will cause *Irumal* (Cough).

(*Irumal* – The disease may likewise be produced by the rupture of the respiratory organs and by the deranged humours. All these varieties of cough pass into consumption, if neglected.)[73]

- “*Suramathey vaatha maagum*”:

In *Iyya Suram* the drug of choice will be to normalise the deranged *Iyyam* humour and simultaneously to increase the *Vatham* humour. Because of the increased *Vatham* humour, the digestive system gets affected and produces *Vatha* symptoms like difficulty in defecation and difficulty in micturition.

- “*Suramathey eelai yaagum*”

The functions of *Vatha* component include producing *pathinaangu vegangal* (14 natural urges/reflexes) in our body. In this disease, *Swaasam* (respiration) which is one of the 14 natural urges get affected. So, one of the excretory functions of the lung (expectorant) in the form of sputum/mucous secretions get affected leading to difficulty in breathing.

(*Eelai* – A disorder of respiration characterised by difficulty in breathing, cough and profuse expectoration. It is due to the contraction of the air tubes in the lungs) [73]

- “*Suramathey Izhuppu maagum*”:

In *Iyya Suram*, the *Vatham* humour gets decreased by affecting the main function of the *Vatham* in the lungs i.e. *Swaasam*. Because of the decreased *Vatham* humor, the excretory function of the lung deranged and simultaneously the *Kabam* humor get increased within the lung that lead to *Izhuppu*.

(*Izhuppu*- the *Vayu* aggravated in the system gets dislodged from its natural seat or receptacle in the body, courses upwards and finds lodgement in the regions of the head, heart, temples etc. It presses upon the nerves of the parts and gives rise to convulsive movements of hands and legs) [73]

The above lines of the poem ultimately conclude that the *Iyya Irumal* symptoms will be caused if the *Iyya Suram* is not treated properly at its earlier stages. So that, *Kabasura Kudineer* which is one of the drugs of choice for mainly for *Iyya Suram* is recommended for prophylactic as well as therapeutic management of COVID-19.

XII. Strengthening of Innate Immune System through *Pranayamam* (Breathing Exercise)

Siddha treatment consists of not only medicines, but also unique therapies such as *Kaya karpam* including *Yogam* (Rejuvenation/Anti-oxidant therapy). Siddhar *Yogam* stresses the importance of breathing exercise *Pranayamam* which is highly recommended for strengthening the respiratory system.

Pranayamam could acutely produce salivary biomolecules with key biological functions immediately after practice. There is a significant increase in the acute expression of molecules cellular processes, immune response, and those molecules were found mainly in the extracellular space and several molecules belong to the Ig super family. *Pranayamam* induces these molecules to promote immune response as a first line of defense in the mucosa. Four tumor suppressors are significantly stimulated after *pranayamam* and one among them was deleted in malignant brain tumor 1 (DMBT1). DMBT1 mediates innate immune response by binding to the bacterial and viral antigens. Binding of soluble DMBT1 is known to reduce the infectivity of HIV1 as well as influenza A viruses (i.e. Type A influenza). DMBT1 is also shown to activate the complement pathway, further supporting its role in innate immune system [74]

XIII. Discussion

Unfortunately, so far we don't have anything that can stop people getting Covid-19 pneumonia. People are already trialling all sorts of medications and we're hopeful Siddha medicine could be effective. At the moment there isn't any established treatment apart from supportive treatment, that is what we give people in intensive care. We ventilate them and maintain high oxygen levels until their lungs are able to function in a normal way again as they recover. In some situations, that isn't enough for the current outbreak. The pneumonia went unabated and the patients did not survive conditions. As per the very recent report following the post-mortem examination of the deceased due to COVID-19, it is observed that pneumonia is not the main culprit but the disseminated intra-vascular coagulation and severe inflammatory processes account for the fast and large scale destruction of lung tissues and death. However as there is no defined treatment for Corona Virus is available at present, the claim of allopathic doctors is that the herbal remedies suggested by various Indian Medical practitioners are not clinically proven or do not have any clinical evidence warrants change in their view. There is no harm in taking these herbs as preventive medicine because they are known for ages as excellent Immune Modulator and used extensively for various Immuno suppressive ailments.

As per Siddhar Thiruvalluvar,

“*Noi naadi noi mutha naadi yathu thanikkum*

Vaainadi vaippa cheyal” - Thirukkural 948

“*Utraan alavum piniyalavum kaalamum*

kataan karudhich cheyal”- Thirukkural 949

The above couplet explains, it is essential to know the diagnosis and cause for the disease, before treating the patient. The nature of patient, the degree of illness, and the season and time of the occurrences of the disease must be noted. This above principle should be kept in mind before treating the patient.

Siddha system has a unique diagnostic method to identify the diseases and their causes The diagnosis is made by observing the five sense organs: Nose, Tongue, Eyes, Ear and the skin; the five senses: Smell, Taste, Vision, Touch and hearing are by interrogation. The primary importance should be given to physical examination of the five sense organs of the patient using those of the physician. According to the Siddhar Theraiyar, there are eight tools of diagnosis: Examination of *Naadi* (pulse), skin (*Sparisam*-palpation), tongue, complexion, voice, eyes, stools and urine(colour, smell, density, quantity and oil drop spreading pattern i.e. “*Meikuri Niram Thoni Vizhi Naa IruMalam kaikkuri*” –Theraiyar. The examination of the *Naadi* and urine have a great significance in diagnosis. [11]

According to Siddha philosophy, the human body consists three functional units and seven structural units they are collectively known as *Muththathukkal* – (three vital life factors namely, *Vatham*, *Pitham* and *Kabam*) and seven *Udatkaddukkal*(physical or somatic components) respectively. Each of the three *Dosham* (*Mukkutrangal*) are classified into sub types and each type is responsible for the special functions of the body. Main cause of *Irumal noigal* is said to be life style, environmental condition, seasonal variations and food habits which cause derangement of *Iyyam* humor along with *Vatham* and *Pitham*. The causative factor should be noted and removed. In *Iyya irumal* the vitiated *Kabam* along with *Vatham*, *Pitham* must be brought to normal condition. For this, initially a purgative, emetic, or a combination of both may be used to normalize the deranged *Kabam* and *Vatham*. The significance of giving such a therapy before

administering the main drug is to remove excess of phlegm from the respiratory tract. Many prepared medicines used for this are *Sanjeevi maathirai*, *Korosana*, *Uththamani thylam*.

As per the administration of emetics and purgative, the vitiated dosham get normalized and main course of the drug shall be started. For this, the following principle is to be adopted. That is “*Ver paru thazhai paru minjinal Mella mella parpa chenduram paaru*”. Common herbs which are used in respiratory diseases possess anti-viral activity, anti-inflammatory, anti-oxidant and immune modulator activities. For example, the following single herbs as per *Gunapadam Porutpanbu Nool*, *Vishnukiranathi (Evolvulus alsinoides, Linn)*, *Sirukurinjaan (Gymnema sylvestre (Retz)R.Br.)*, *Isangu (Clerodendrum inermw Linn.)* have proved that they possess Anti-viral activity(Anti-coronavirus)[75] and *Karkkadagasingi (Rhus Succedanea Linn.)* [76] Inhibits the polymerase of HIV-1 reverse transcriptase [77] which is directly indicated for *Irumal noigal* in Siddha literatures.

Anti viral activity-which might be associated with blocking of the proliferation and replication of the viral particles, and that they might be able to improve lung damage. Notable host pathways shown to interact with SARS-CoV-2 during its replication include antiviral pathways in the innate immune response such as the stress granule protein G3BP1, a known antiviral protein that induces the innate immune antiviral response [78]

Anti-inflammatory action - particular importance in the treatment of severe cases of COVID-19, when the host inflammatory response becomes a major cause of lung damage. Anti-inflammatories are likely to be effective against the consequences of the elevated levels of cytokines (including interferon- γ) typically observed in people with COVID-19. [79] Anti-oxidant activity -cytokine storm mainly affects the lungs; leading to acute lung injury. Modulation of cytokine production using antioxidant may modulate the host immune response and ameliorate the cytokine storm associated with viral diseases such as COVID-19. [80]

Immune modulator action- Patients with serious or critical clinical symptoms show marked T cell lymphopenia. Functional exhaustion of T cells is suggested by high expression of T-cell exhaustion markers ameliorated production of multiple inflammatory cytokines, reversed the loss of T lymphocytes as well as functional T cell exhaustion and reduced the leukocyte infiltration of multiple organs. [81]

At first herbal remedies must be tried. If there is no relief, the powerful inorganic preparations such as *Parpams*, *Chendoorams* and *Karuppu* must be given. They are *Kasthuri karuppu*, *Pavazha parpam*, *Thaalaga parpam*, *Muththu parpam*, *Sembu parpam*, *Pooranachandrodhayam*, *Palagarai parpam*, *Nathai parpam* and *Chippi parpam*. Most of the *parpams* and *chendurams* indicated for respiratory illnesses possess gold, iron, zinc, magnesium etc. *Parpam* and *chenduram* are minerals treated with herbal juices and may lead to reduction in particulate size even down to nanoparticle levels. Nanomaterials offer unique physico-chemical properties that have linked benefits for drug delivery as ideal tools for viral treatment. Tiny iron oxide nanoparticles when coated with silica, have a strong affinity for RNA, the genetic material inside the virus that causes COVID-19, seems fight the coronavirus outbreak. [82]

External medicines (*Pura marundhugal*) which are used to eliminate the symptoms of running nose, cough, chest congestion, headache. *Nasiyam* (Nasal Instillation) - *Nasiyam* is a process by which the drug is administered through the nostrils. The intranasal route may allow certain drug molecules to bypass the blood brain barrier via diffusion or axonal transport along olfactory and trigeminal nerves. The numerous capillaries embedded in the nasal mucosa absorb the medicine and produce various kinds of local and systemic effects by mechanical and chemical reactions. The discharge secreted contains the blocking morbid and are evacuated through nasal route. Thus the pathological condition is reversed and the disease is relieved.

Ottradam (Fomentation) – This procedure involves the purification, local healing, analgesic and anti-inflammatory action of the topical applications and fomentation is given in the form of compression and relaxation of medicated packs. *Ottradam* removes wastes as toxins through the skin and balances three humours. It is also dilating all body channels for cleansing. While giving fomentation the heat is increased and gets mobilized.

Vedhu (Steam inhalation) - it involves the inhalation of water vapour. The warm, moist air is thought to work by loosening the mucus in the nasal passages, throat, and lungs. This may relieve symptoms of inflamed, swollen blood vessels in nasal passages. *Pootchu* (Liquid poultice), *Pottanam* (Bundle application), *Pugai* (Medicated fumigation)

Various disinfectants used in ancient times and detailed in Siddha literatures are eco-friendly, possess minimal harm and more suitable than the chemicals which are used nowadays.

Siddhars, the spiritual scientists of Tamil Nadu explored and explained the reality of nature and its relationship to man by their yogic awareness and experimental findings. They cured innumerable diseases amazingly and designed a perfect protocol for every disease for their prevention and treatment.

Siddha medicine is a not only a medical system for curing diseases of the physical body, but also it's a way of life formulated by Siddhars through their vision and realisation for getting healthy body and healthy mind. These endemic, epidemic, pandemic diseases do not stop here and it will continue in the coming decades.

Therefore we should keep our immune system strong as much as possible and should change our lifestyle as per the guidelines given in our Siddha system.

XIV.Conclusion

In this study, the humoral concepts of *Iyya Irumal* critically analysed with SARS CoV-2 and it may be a platform to create scientific evidence for integrative approach for arriving the clinical diagnosis and therapeutics. This review work on etio-pathogenesis of *Iyya Irumal Noi* would also pave the way for identification of more individualized methods of treatment strategies. The epistemologically sensitive research on the philosophy of Siddha on *Iyya irumal* may help to identify early predictors of *Irumal Noigal* (Respiratory infections) which may be useful for prevention. The Siddha medicines are natural, easily available and cost effective and it can be administered for a prolonged period without any adverse reactions. No assistance is required and there is no strenuous procedure involved in taking the Siddha drugs. These medicines despite their continuous usage for many centuries, for universal acceptance, it requires modern scientific studies to evaluate the safety and efficacy. If those studies are done then it will be beneficial to the society for lowering the treatment cost of respiratory diseases as well as the mortality rate.

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Conflicts of interest

No conflict of interest

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