

A Review of the Evidences Showing that Certain Plant Medicines can be Useful for Novel Corona Virus Treatment

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Abstract

Considering growing concerns of the world's authorities on the spreading of novel corona virus (Covid-19), in this paper we review the evidences showing that certain plant medicines can be useful for novel corona virus treatment. Our argument is based on research finding that corona virus has viral envelope glycoproteins. In this regard, Mannose-binding lectins have been shown to be able to break down the shells that surround this class of viruses - which includes COVID-19 virus. Therefore, it seems useful to consider medicinal plants which have Mannose-binding lectins in order to break the glycoproteins envelope of the virus. This is an initial review on this subject, further research in direction as outlined here is recommended.

Keywords: *Phytochemistry; Phytomedicine; Plant Medicine; Mannose-Binding Lectins*

"It is better to light a candle than curse the darkness" - a Chinese proverb¹

Subject Classification Numbers: NLM 2017, WF 600.

Introduction

The present paper reflects a growing concern on the spreading Covid-19 virus over more than 60 countries to date. The SARS-like coronavirus that appears to have originated in Wuhan, China has now infected thousands of people. According to Worldometers, as of March 4, 2020, there have been 93,191 confirmed cases around the world, 3,203 death cases and 50,984 recovered. The COVID-19 is affecting 80 countries and territories around the world and 1 international conveyance (the Diamond Princess cruise ship harbored in Yokohama, Japan)².

The virus was initially named novel coronavirus of 2019 (nCoV-2019 or 2019-nCoV) as of now. This has now been renamed as COVID-19. Sequencing of the virus has determined it to be 75 to 80 percent match to SARS-CoV and more than 85 percent similar to multiple coronaviruses found in bats. SARS stands for severe acute respiratory syndrome. It is also a coronavirus or CoV [1].

¹Note: some authors attributed this quote to William Watkinson, 1907.

²Source: <https://www.worldometers.info/coronavirus/>

A Review of the Evidences Showing that Certain Plant Medicines can be Useful for Novel Corona Virus Treatment

Despite this gloomy picture, there is also news reporting that all corona patients in 3 countries, including Vietnam and Nepal have recovered³. Therefore, there is ground to be hopeful that cure does exist.

Research over the past two decades shows that certain herbal medicines can fight the new Wuhan coronavirus contagion. Therefore, in this short review, we discuss some of the evidences showing that certain plant medicines can fight similar viral infections such as SARS, MERS and Ebola and why this can also apply to the Wuhan coronavirus, in particular by virtue of Mannose binding lectins [1].

A preliminary review of basics of respiratory medicine

It has been commonly accepted that Covid-19 belongs to respiratory diseases related to viral pneumonia. Studies show that there are glycoprotein shells covering the corona viruses, which make it difficult to break the virus.

First of all, let us review some basic facts from textbooks of respiratory medicine:

1. Oxford Handbook of Respiratory Medicine wrote regarding viral pneumonia, which can be rephrased as follows: "Viral URTIs are normal, yet commonly self-restricting, and are typically overseen in the network. Viral pneumonia is less normal yet is progressively genuine and typically requires hospitalization. Viral pneumonia in the immunocompetent is uncommon and regularly influences kids or the old; flu strains are the commonest cause in grown-ups. Studies recommend that infections are perceivable in 15 - 30% of patients hospitalized with pneumonia. Infections may cause genuine respiratory disease in the immunocompromised (especially patients with discouraged T-cell work, for example following organ transplantation). CMV is the commonest genuine viral pathogen that influences immunocompromised patients. Flu, parainfluenza, rSV, measles, and adenovirus may likewise cause pneumonia in the immunocompromised, despite the fact that analysis of these infections is troublesome and contamination is generally undetected" [9].
2. Shen Wei Lim in ERS Handbook of Respiratory Medicine wrote on influenza and pandemic which can rephrased as follows: "Flu is profoundly transmissible. Human-to human transmission happens through huge bead spread and direct contact with emissions (or fomites).... Treatment: There are two principle classes of medication that are dynamic against flu. The M2 particle channel inhibitors, amantadine and rimantadine, are viable against flu A. Be that as it may, their utilization is thwarted by the quick rise of protection from these medications together with a high rate of symptoms. Antibiotics are generally prompted for patients with flu related pneumonia or patients with serious flu disease who are at high danger of creating auxiliary bacterial contaminations. The utilization of corticosteroids in serious flu can't be routinely supported dependent on current information; observational accomplice contemplates led during the 2009 H1N1 pandemic have detailed blended outcomes including expanded mischief" [10].

Therefore, it seems we can conclude that even though there are recommendations for such a viral pneumonia, there is no clear suggestion yet of how the best treatment in a pandemic situation.

Literature Review and Discussions

Review on glycoproteins envelope and mannose-binding lectins

Studies show that there are glycoprotein shells covering the corona viruses, which make it difficult to break the virus.

³Source: <https://japantoday.com/category/world/all-16-of-vietnam%27s-coronavirus-sufferers-cured>

A Review of the Evidences Showing that Certain Plant Medicines can be Useful for Novel Corona Virus Treatment

Research tells us, which can be rephrased as follows: The viruses that infect human beings motive a massive global disease burden and produce immense challenge closer to healthcare system. Glycoproteins are one of the principal aspects of human pathogenic viruses. They have been tested to have vital role(s) in contamination and immunity. Concomitantly high titres of antibodies towards these antigenic viral glycoproteins have paved the way for development of novel diagnostics [3].

Stephen Harod Buhner in his book: Herbal Antivirals, argues that it is possible to find plants which can be used for treatment of viral respiratory infections. In page 36 in his book, he wrote, which can be paraphrased as follows: "Plants that decrease the other primary cytokines that the infection animates will likewise help diminish illness seriousness and forestall lung harm. I think the most significant are inhibitors of NF- κ B (Chinese senega root, Chinese skullcap, ginger, houttuynia, kudzu, licorice, boneset, astragalus), IL-6 (kudzu, Chinese skullcap, isatis), IL-8 (cordyceps, isatis, Japanese knotweed), RANTES (licorice, isatis), MCP-1 (houttuynia), CXCL10 (boneset), CCL2 (boneset), the ERK pathway (kudzu, Chinese skullcap, cordyceps), the p38 pathway (Chinese skullcap, houttuynia, cordyceps) and the JNK pathway (Chinese skullcap, cordyceps etc)" [11].

Following Buhner's suggestion as mentioned above, in this paper we will also review a number of evidences showing that certain plant medicines can be useful for novel corona virus treatment. Our argument is based on research finding that corona virus has viral envelope glycoproteins. In this regard, Mannose-binding lectins have been shown to penetrate and break down the shells that surround this class of viruses - which includes COVID-19 virus. It is also known that MBL deficiency is responsible for weakened immune system, which may affect pneumonia etc [2].

As Mbae., *et al.* wrote, which can be paraphrased as follows: "Restorative plants have various helpful low sub-atomic weight phytochemicals and macromolecules, for example, polysaccharides and proteins. Lectins are glycan restricting proteins pervasive in the cell and the extracellular surface of every living creature. Plant parts contain lectins with assorted glycan restricting specificities" [16].

Studies have discovered that these Mannose-binding lectins spoil down the glycoprotein shells of the viruses noted above, inclusive of Ebola and SARS. A quantity of animal checks and human telephone laboratory exams have shown that these mannose-binding lectins are successful in halting replication of the virus [1].

Therefore, it seems worthy to consider medicinal plants which have Mannose-binding lectins, in order to break the glycoproteins envelope of the corona virus.

A short review of possible treatment of corona virus by three medicinal plants

Griffithsin red algae

According to Case Adams: Red algae Griffithsin has also verified to be antiviral towards HIV-1 (human immunodeficiency virus), HSV-2 (Herpes simplex virus), HCV (Hepatitis C) and the Ebola virus. What do these viruses have in common? Along with COVID-19, they all have glycoprotein shells around them [1].

Another mannose-binding lectin found to be antiviral against these viruses is the *Scytonema varium* red algae, also called Scytovirin. Another one was found in the *Nostoc ellipsosporum* algae species - called Cyanovirin-N [1].

Other than that, in 2019 France's Institut de Recherche et Développement has tested a number of different species and observed the *Ulva pertusa* algae species and *Oscillatoria agardhii* blue-green algae can be useful to halt the replication of these viruses [1].

Health store availability

Red algae is a supplement that can be purchased in fitness meals shops and online. Most of the commercial dietary supplements labeled pink algae make use of the *Gigartina* species of purple algae (such as *Gigartina skottsbergii*). This species has been tested towards HSV and HIV in laboratory testing, but not yet on CoVs to date [1].

Licorice root

Adams et al. have also published evidence that licorice root can fight SARS and MERS CoV infections. Studies have found that licorice root extracts were able to reduce SARS and MERS-CoV replication [1].

Besides, in a 2008 study the UK's Luton and Dunstable Hospital NHS Foundation Trust tested licorice root extracts towards a quantity of viruses, such as HIV and SARS. They found that the extract broke down the viral envelope and also boosted immune activity [1].

For mechanisms, researchers stated, which can be rephrased as follows: Mechanisms for antiviral endeavor of licorice root consist of reduced transport to the membrane and sialylation of hepatitis B virus surface antigen, discount of membrane fluidity leading to inhibition of fusion of the viral membrane of HIV 1 with the cell, induction of interferon gamma in T cells, inhibition of phosphorylating enzymes in vesicular stomatitis virus contamination and discount of viral latency [1].

Curcuma and other plant lectins

In this section, allow us to shortly mention *Curcuma zedoaria* rosc. A paper by R. Lobo et al. stated, which can be rephrased as follows: *Curcuma zedoaria* Rosc, additionally regarded as white turmeric, zedoaria or gajutsu, is a perennial rhizomatous herb that belongs to the Zingiberaceae family. The plant is indigenous to Bangladesh, Sri Lanka and India, and is additionally widely cultivated in China, Japan, Brazil, Nepal and Thailand. In India it is recognized by using its countless vernacular names, the most oftentimes used ones being Krachura (Sanskrit), Gandamatsi (Hindi) and Sutha (Bengali). It is used historically for the therapy of menstrual disorders, dyspepsia, vomiting and for cancer. Rural people use the rhizome for its rubefacient, carminative, expectorant, demulcent, diuretic and stimulant houses whilst the root is used in the remedy of flatulence, dyspepsia, cold, cough and fever [5].

Another study by Tiphara, *et al.* has an abstract which can be rephrased as follows: Mannose-binding lectin was once isolated from rhizomes of the medicinal plant *Curcuma zedoaria*. We used extraction with 20 mM phosphate buffer, ammonium sulfate precipitation, ion alternate chromatography on Q-Sepharose, gel filtration chromatography on Superdex 75 and reverse-phase HPLC. The purified lectin yielded a single band on SDS-PAGE that corresponded to a molecular mass of 13 kDa [4].

Therefore, the studies seem to suggest that medicinal plant *Curcuma zedoaria* rosc. may also be found useful for corona virus. Nonetheless, more research is recommended. See also related studies [6,7].

Beside *Curcuma zedoaria* rosc, a 2007 study from Belgium's University of Gent studied plant-derived mannose-binding lectins on SARS (severe acute respiratory syndrome) coronavirus and the feline infectious peritonitis virus (FIPV). The researchers studied known plant lectins from 33 different plants in the laboratory, using infected cells. The researchers wrote, which can be rephrased as follows: Of the 33 flora tested, 15 extracts inhibited the replication of both coronaviruses. Those antiviral lectins have been profitable in inhibiting the replication of the viruses [1].

The 15 coronavirus-inhibiting plants were:

A Review of the Evidences Showing that Certain Plant Medicines can be Useful for Novel Corona Virus Treatment

- Amaryllis (*Hippeastrum* hybrid)
- Snowdrop (*Galanthus nivalis*)
- Daffodil (*Narcissus pseudonarcissus*)
- Red spider lily (*Lycoris radiate*)
- Leek (*Allium porrum*)
- Ramsons (*Allium ursinum*)
- Taro (*Colocasia esculenta*)
- Cymbidium orchid (*Cymbidium hybrid*)
- Twayblade (*Listera ovata*)
- Broad-leaved helleborine (*Epipactis helleborine*)
- Tulip (*Tulipa hybrid*)
- Black mulberry tree (*Morus nigra*)
- Stinging nettles (*Urtica dioica*)
- Tobacco plant (*Nicotiana tabacum*).

Last but not least, besides *Curcuma zedoaria* rosc, based on his preclinical study Prof. Chaerul Anwar Nidom from Indonesia stated that curcumin which is contained in various traditional herbs found in many places in Indonesia can also be helpful to protect human body against the cytokine storm which is triggered by corona virus [8].

For other references on Mannose binding lectins in certain plants, see for instance [14-17].

Concluding Remarks

We have reviewed a possible mechanism to break the corona virus envelope with lectins. This is just an early schematic paper, it would need more study to establish which the suggested medicinal plants lectins are the most beneficial for corona virus treatment.

In the last section, we reviewed three medicinal plants which have mannose-binding lectins, and therefore they may be found useful for corona virus treatment. Those three plants are: griffithsin red algae, licorice root, and *Curcuma zedoaria* Rosc. Nonetheless, further investigation is recommended especially to find out the mechanism of the lectins to break down the virus envelope.

This paper is just an initial review on this subject, further research in this direction as outlined here is recommended.

We hope that this short review article can be found useful for policy makers of health in reducing the effect of Covid-19 in many countries.

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Conflicts of Interest

The authors declare no conflict of interest.

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