



# Herbal Remedies Against Co-Morbid Conditions of COVID-19 Disease, A Review

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## Abstract

In the recent time the whole world is put to a set back by a bit of very bad news in form of a virus commonly known as COVID-19 virus that has taken away precious life and wealth. Research throughout the globe has suggested co-morbidity as a major player for the death of millions. The co-morbid conditions include diabetes, poor immunity, cardiac ailments, cancers, and other related conditions. Since vaccine and other therapeutic measures are not available, immunity is the only factor one can rely upon. Since immunity depends upon multiple factors beyond the scope of control, many edible products of plants have been found to be able to boost the immune system. These edibles are easily available in day to day life and have become a must in today's context. This article reviews the efficacy of 6 most commonly available plant products as wonderful immune boosters.

## Keywords

Asymptomatic, Cardioprotective, Nutraceuticals, Oxidative stress

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## PRELUDE

The malfunctioning of the malfunctioning of the physical, mental or sexual wellbeing that destroys life as well as living can be referred to as disease. A disease or a compromised state of life can be caused due to a variety of reasons. Diseases may be of different types and classification or may have some common as well as unique symptoms; it destroys the solidarity of an individual or a family. Broadly, diseases are usually classified as physical diseases, mental diseases, infectious diseases, non-infectious diseases, deficiency diseases, inherited diseases, degenerative diseases, social diseases, self-inflicted diseases etc. Moreover diseases are also classified as acute diseases in case of sudden onset of the ailment and chronic diseases where the effects of the disease can last long.

The most common of all, the infectious diseases are those which are said to be transmitted by pathogens

which spread through contact or proximity by means of agents like air, water, soil or through vectors. Pathogens can be either bacteria, virus, fungi, protozoan or helminth etc.

However in the present context, a compromised state of health that has spread across continents is an outcome of an invisible bit of very bad news from the seventh known member of the Corona virus family named as (SARS-CoV-2)<sup>[1]</sup> causing a disease called COVID-19. The virus responsible for the pandemic was first identified in December 2019 in Wuhan, Hubei, China.<sup>[2]</sup>

Although the Symptoms of COVID-19 are variable but it has been seen to start with mild to high fever along with cough<sup>[3]</sup> which may eventually lead to fatigue with development of difficulty in breathing after a week or so. However, these symptoms of the said disease share resemblances with many other diseases such as common viral fever or flu. In

connection to the above some typical symptoms include Dyspnea, muscle and joint pains<sup>[3]</sup>, temporary loss of sense of smell or Anosmia, loss of sense of taste or Dysgeusia<sup>[4]</sup> act as add-ons to the dreadfulness of the disease and calls for the symptom-based screening.<sup>[4]</sup> Other symptoms include gastrointestinal disturbances such as loss of appetite, nausea, watery motions.<sup>[1]</sup> However many people who have been tested to be positive for the presence of the virus never experienced any symptom of the disease and are referred to as Asymptomatic.<sup>[5]</sup>

Although the details of the mode of transmission of the virus is still under investigation, it is supposed that the transmission may be pre-symptomatic<sup>[6]</sup>, symptomatic or asymptomatic.<sup>[7]</sup> In the above context, COVID-19 is supposed to be transmitted primarily when people are in proximity and a person inhales small droplets produced by an infected person who may be pre-symptomatic or symptomatic or a symptomatic while coughing, sneezing or talking.<sup>[8]</sup>

In connection to the above WHO also proposed that transmission of the COVID-19 virus may be through aerosols<sup>[9]</sup> containing the virus in which the virus may remain infective for a duration of 3 hours.<sup>[10]</sup> As a preventive, in our country ICMR in recommendations of WHO suggests a social distancing of 3 feet to prevent droplets of a carrier coming in contact with a healthy person.<sup>[11]</sup>

Till date no therapeutic strategies in form of medicine have not been found for the disease<sup>[12]</sup> but immense fast track research is being carried out throughout the world as an attempt to generate a vaccine for the disease. Some of the vaccines are under different phases of clinical trials. In reference to this Chen G et al 2020 have found that cell mediated immune responses along with humoral immune responses occur in case of the CoV-2 virus infection in humans<sup>[13]</sup> whilst large number of cases of recovery has also been recorded among cases of infection.<sup>[14]</sup> But whether chances of re-infection are still under research.

The said global pandemic declared by the World Health Organization with its devastating effects on world population with imminent dangers that this virus poses to humanity there can be certain methods to improve our immunity which can be the only paramount at this juncture until a proper therapeutic strategy in form of vaccine is discovered. Moreover, if a vaccine is discovered still it would take years to immunize the entire Indian population or the world population as a relief from this curse. In the present COVID-19 condition medical experts suggest comorbidities associated with COVID-19

disease which make the condition severe and fatal. Hypertension, Diabetes, cancers, and immune-deficiencies have been found to enhance the complexities of COVID-19 disease. It makes the COVID-19 symptoms worse and even more fatal. Since vaccine availability to each and every individual in the country would take long time even if vaccine is discovered, it's the need of the hour to enhance our immunity and minimize the chances of co-morbidity. This review aims at the documentation of miraculous 6 herbal or plant based food or Ayurvedic supplements to boost our immunity in a way that doesn't harm our body and prevent us from the co-morbid conditions that complement the devastations caused by the COVID 19 Virus. The herbs described here have been known for ages regarding their therapeutic potential in ancient Ayurveda and can be used to formulate Nutraceuticals. This review intends to document some of these Nutraceuticals on the basis of their availability as food, on the basis of their chemical nature and mode of action.

#### **Moringa spp (drumstick)**

The herbal medicinal roles of Moringa are numerous and are recognized in the Ayurvedic and Unani Medical sciences since long.<sup>[20]</sup> different parts of this plant: root, bark, gum, leaf, fruit, flowers, seed etc have been used as different herbal medicines that accounts for a long list of ailments.<sup>[20]</sup> Several studies reveal that treatment with extracts of Moringa has shown promising results against metabolic and lifestyle ailments such as diabetes and hypertension.<sup>[21]</sup> Also studies in Zimbabwe showed the use of this plant in treatment of HIV positive patients.<sup>[22]</sup> In animal studies, Osman and Abohassan, 2012 analysed the potential of leaves of Moringa peregrine on oral administration of its extracts and found a decrease in the spleen cell numbers which the supposed as migration of lymphocytes from spleen to blood.<sup>[15]</sup> They also found that dry leaves of this species are good sources of protein and essential amino acids along with essential minerals and that the leaves could be consumed raw or along with meals or as dietary supplements. A study also showed that administration of leaf extract of Moringa sp caused increase in weight of spleen, thymus and other lymphoid organs due to increased lymphocyte proliferation, a key to enhanced T lymphocyte proliferation in normal and immune-compromised mice.<sup>[16]</sup>

Furthermore, research also showed enhanced numbers of WBCs in peripheral blood on oral gavage of increasing concentrations of ethanolic extracts of Moringa sp in mice<sup>[17]</sup> which suggests acceleration of immune activities. Moreover, Moringa has been

shown to be a natural source of antioxidants and perform anti-inflammatory actions<sup>18</sup> that advocate their applications for functional food or nutraceuticals.

#### **Withania somnifera (Ashwagandha)**

Commonly known as "Indian Winter cherry" or "Indian Ginseng" is one of the most important herbs of Ayurveda used for ages as a Rasayana for its unlimited health benefits. It's well known use as general tonic and adaptogen has been since long. Besides it is also used to relieve physical and mental stress.<sup>23</sup> Singh et al 1982 has stress upon its use as immune booster.<sup>24</sup> Studies have shown that cardiorespiratory fitness is directly related to the risk of cardiorespiratory ailments and the physical wellbeing of an individual.<sup>25</sup> Maximum oxygen consumption is used as an indicator of cardiorespiratory fitness.<sup>26</sup> In connection to the above numerous studies have shown that use of Ashwagandha, underscored the significant increase in Maximum oxygen consumption in healthy as well as weak subjects.<sup>27</sup> There are studies that demonstrated elevated muscle strength, control of lipid profile and relief from insomnia by consumption of Ashwagandha.<sup>28</sup>

Free radicals and reactive oxygen species mediated human diseases like cancer, stroke, myocardial infarction, diabetes etc have been primary issues of concern in the present-day complexity of life and the growing pollution levels. Ashwagandha has been shown to contain numerous compounds including alkaloids like ashwagandhine, cuscohygrine, anahygrine, steroidal compounds including ergostane type steroidal lactones, saponins etc which have been analysed to have free oxygen scavenging potential leading to marked reduction of oxidative stress and damage.<sup>29</sup> Polyphenolic natural antioxidants as in Ashwagandha have also been shown to possess antiviral, anti-inflammatory and anti-cancer properties.<sup>30</sup> Research in many places throughout the world has shown the efficacy of Withaferin A, constituent of Ashwagandha, having a well marked anti-viral activity.<sup>31</sup> Studies on animal models and cultured cell lines show the blood glucose lowering efficacy of ethanolic extracts of various parts of Ashwagandha promise its future use in designing herbal drugs and Nutraceuticals for therapeutic strategies for Diabetes Mellitus.<sup>32</sup>

The above-mentioned studies and findings clearly indicate the therapeutic potential of Ashwagandha for many ailments.

#### **Tinospora cordifolia, (Giloy)**

Giloy is a herbal immunity booster also beneficial for diabetic patients<sup>33</sup> that is proposed to manage blood glucose levels and has been widely used since ages in

Ayurvedic practices. It is also supposed to be a herbal formulation of choice for maintenance of metabolism and weight management. Moreover, it has also been suggested to have antipyretic activity and enhancement of platelet count in dengue fever. It is consumed as juice, tablets or powder form.<sup>34</sup> Research shows that Giloy has a well-marked anti-inflammatory potential and enhances body's defense against infections<sup>35</sup> by way of increasing macrophage activity, a must for clearing cellular debris, extra and intracellular disease causing agents.<sup>35</sup> Giloy juice or tablets are supposed to be beneficial in fighting respiratory diseases owing to its antimicrobial property by way of fighting respiratory tract infections.<sup>36</sup> The bioactive ingredients in stem extracts of Giloy called 1,2-substituted pyrrolidines acts as a key player for anti-diabetic activity of Giloy.<sup>37</sup> In connection to this, it was shown that administration of extracts of Giloy significantly inhibited inflammation and pain in carrageenan-induced hind paw edema in albino rats.<sup>38</sup>

The bioactive ingredients and compounds present in Giloy play a significant role in the immunomodulatory activities by way of enhancement of activities of macrophages.<sup>39,40</sup> Studies have also shown that treatment of aqueous and alcoholic extracts of giloy to cultured HeLa cell lines caused DNA damage by way of increasing micronuclei production in a concentration dependent manner which shows the efficacy of giloy to propose a herbal cure of the dreaded disease called cancer.<sup>40</sup>

With reference to the above the various active ingredients of giloy such as alkaloids and sesquiterpenoids have been shown to have well marked antiviral<sup>42</sup> and antibacterial<sup>43</sup> properties which may promise a side effect free cure for many of such infections and their effects.

#### **Curcuma longa (Turmeric)**

The use of turmeric dates back ages to the period of Vedic culture in India. It has always been a spice to enhance taste and impart good colour to food as well as an ingredient which was supposed to be a substance which could be consumed to cure innumerable number of diseases as well as to enhance the aesthetic and religious aspects of life. The main component of turmeric is the root from which a volatile oil called Turmerone and coloring agents called Curcuminoids are obtained. Chemically Curcuminoids consist of curcumin demethoxycurcumin, 5'-methoxycurcumin, and dihydrocurcumin, which have a great deal of antioxidant activity and imparts protection against oxidative stress.<sup>44</sup>

Several animal studies have shown that Curcumin inhibits lipid peroxidation and neutralization of the lipid radicals.<sup>45</sup> In connection to this curcumin also inhibits lipid peroxidation along with demonstrating free radical-scavenging activity.<sup>46</sup> Research shows that administration of turmeric through diet could inhibit chemical carcinogen induced development of mammary tumors rats through the antioxidant properties.<sup>47</sup>

Moreover, several studies also showed the anti-diabetic potentials of alcoholic extracts of turmeric in various genetic and overt diabetic animal models such as rodents.<sup>49,50</sup>

In connection to this randomized, double-blinded, placebo-controlled clinical trials in pre-diabetic and type2 diabetic populations it was found that curcumin extract significantly reduced blood glucose levels by way of improvement in  $\beta$ -cell functions.<sup>50</sup>

Agadihiremath Viswanatha Swamy et al, 2012 showed that Doxorubicin treated rats showed cardiac ailments with significantly decreased activities of enzymic antioxidants such as GSH, SOD and CAT. This proves the oxidative stress involved with cardiac damage. Administration of Curcumin, a turmeric product brought amelioration of the chemical induced cardiac damage and also brought about statistically significant increase in the activities of the said enzymic antioxidants.<sup>51</sup>

There are several studies on the antiviral efficacies of turmeric constituents. Research shows that curcumin an active ingredient of turmeric shows different mechanisms of action against human immunodeficiency viruses where it has been shown to inhibit HIV-1 integrase [93].

#### **Nigella sativa (Black cumin)**

Apart from being a spice of choice in Indian kitchens and cuisines, black cumin has been used for ailments like headache, toothache, nasal congestion, asthma, arthritis etc. numerous in-vivo and in-vitro studies have reported the efficacy of black cumin as potential and effective antioxidant.<sup>53</sup> administration of black cumin preparations in experimental rats under induced oxidative stress, showed significant increment of enzymic antioxidants such as Glutathione-S-transferase, glutathione reductase and GSH-Px against oxidative stress.<sup>54</sup>

Furthermore, a clinical trial study showed that black cumin oil with a less calorific diet could neutralize oxidative stress by way of modulation of activity of SOD in humans<sup>55</sup> which reveal its well-marked antioxidant properties.

Studies related to streptozotocin induced diabetes in animal models showed that treatment of black cumin preparations into such animals caused improvement

in the altered histo-architecture of pancreatic beta cells in comparison to the diabetic animal as control.<sup>56</sup>

In connection to the above Abdelrazek H 2018, also showed a similar result that administration of black cumin preparations into chemical induced diabetic mice caused substantial and significant increments in the antioxidant levels in liver and pancreatic tissue.<sup>57</sup> Moreover, clinical studies reveal that black cumin formulation when given to patients of type 2 diabetes mellitus showed good results by way of lowering fasting blood glucose level and lowering the HbA1c without major alteration in body weight of diabetic subjects.<sup>58</sup>

Murugesan M, 2012, found that black cumin had protective roles in connection to myocardial ailments and other cardiovascular diseases in rats and showed the cardioprotective role of black cumin by way of lowering of cardiac markers such as VLDL, TG, cholesterol, free fatty acids, the levels of marker enzymes in serum such as AST, ALT, LDH, CK etc.<sup>59</sup>

Study by Huseini et al 2017, shows that black cumin oil could impart hypotensive effects by way of lowering systolic and diastolic blood pressures in subjects as compared to placebo controlled and untreated ones.<sup>60</sup>

#### **Allium sativum (Garlic)**

Garlic may be well if you referred to as one of the most indispensable flavoring condiments and spices used in the diverse type of food which date back to ancient centuries of human Civilization. The use of garlic as an edible against has shown to be associated with human health and has been found to cobble cure of many diseases since time immemorial. In history of Medical Sciences garlic in various forms have been used to treat different ailments in different ways maybe in edible form or as paste with other substance for application on various parts of the body.

Garlic and several formulations of garlic have been used for prevention and treatment of cardiovascular ailments. There are a number of scientific studies made throughout the globe that advocate the efficacy of garlic consumption leading to lowering blood pressure, prevention of atherosclerosis, reduction of serum cholesterol and triglyceride etc. more over garlic and constituents of garlic have been found to inhibit platelet aggregation and causing increment of fibrinolytic activity.<sup>61</sup> Moreover studies in mice have also reported that garlic significantly lowers the risk of peripheral arterial occlusive diseases, unstable angina and increases elasticity of blood vessels.<sup>62</sup>

Many studies have reported that garlic can significantly reduce blood glucose level in diabetic

animals. Experiments in chemical induced diabetes in mice show that garlic treatment was found to be effective in blood glucose regulation.<sup>63</sup>

Studies have also shown that treatment of garlic and preparations of garlic on animal models as well as culture human cancer cell lines have shown to significantly enhance the activities of enzymic antioxidants such as super oxide dismutase, catalase, glutathione reductase, peroxidase etc.<sup>[64,65]</sup> In connection to this, garlic and its active ingredients such as Allicin etc have been shown to have remarkable anticancer properties and has a promising future towards development of herbal chemotherapeutic agents. Several experiments throughout the world has shown that garlic through its antioxidant properties can control the cell cycle activities in cultured cancer cell lines.<sup>[66,67]</sup> Thus garlic, an easily available plant product can provide us with immense number of health benefits.

## CONCLUSION

They use plant parts such as leaves, flowers, stem, root and even parts like bark have been known since ages as edible condiments or spices and herbal medicines formulations. Different parts of plants different medicinal uses. Herbal formulations aim at restoration of normal body functions and relieve from ailments in a manner free from side effects as imparted by synthetic chemical medicines. Herbal health products have become a billion-dollar industry.

The 6 plant products described above are one of the most easily available ones and usually found in the refrigerators and stores in every families. These should be consumed as such or as medicines available so as to combat with the common ailments that increase the chances of comorbidities in the present Covid 19 conditions.

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