IMMUNITY BOOSTERS TO COMBAT COVID-19 PANDEMIC

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ABSTRACT

Corona virus disease 2019 (COVID-19) pandemic is caused by SARS-CoV2 (Severe Acute Respiratory Syndrome Coronavirus-2). It primarily targets lung epithelial cells of human respiratory system. The original strain of coronavirus was first identified at the end of December 2019 and emerged during an outbreak in Wuhan, China. The SARS-CoV-2 infection is mostly seen in the people with weak immune system. There are different ex-situ approaches to prevent the infection of corona virus viz., use of masks, sanitizing body and surfaces and maintaining social distance. But apart from them, in-situ prevention approaches like inclusion of nutrient rich healthy foods and herbs in daily diet helps to protect the body from inside by strengthening immune system. Thus, to strengthen immune system from inside we need to take immunity boosters, apart from normal healthy diet. These immunity boosters are prepared from leaves, roots, stems, flowers, barks and some other parts of medicinal and spice crops. These contain a mixture of proteins and other organic chemicals and carbohydrates, which include alkaloids, flavoids, glycosides, saponins, and terpenes. Kabasura kudineer, Nilavembu kudineer, Immuplus, Echinacea liquid, Immusarc, Septilin and immunity plus are some of the important immunotronics to strengthen and to protect body from infections and safeguard health. In this context we have to supplement our body with these immunity boosters to fight against not only COVID-19 but also other diseases.

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1 Introduction

Coronavirus belongs to the genus betacoronavirus and subfamily orthocoronavirinae, which infects humans, bats and wild animals (Tiwari et al., 2020; Zhu et al., 2020). It primarily targets the human respiratory system. Coronavirus disease 2019 (COVID-19) is caused by severe acute respiratory syndrome coronavirus – 2 (SARS-CoV-2) which has emerged as a novel coronavirus from Wuhan, China in December 2019. The virus got rapidly spread to more than 215 countries, and is currently posing a pandemic having high global threats and challenges while affecting more than 43 million people with causing 1.16 million deaths as of 26th October, 2020 (Ciotti et al., 2020; Dham et al., 2020; Malik et al., 2020; Rodriguez-Morales et al., 2020; Rothen & Byraredy, 2020). Lung epithelial cells are the primary target of the virus through angiotensin-converting enzyme 2 (ACE2) receptor (Wan et al., 2020). The term coronavirus was coined from the Latin word corona that means "crown" like shape (Rabi et al., 2020). The suffix 2019 novel coronavirus or “2019-nCoV” coronavirus was given by WHO on 12 January 2020. SARS-CoV-2 transmission is via human-to-human, mainly through direct contact and/or by contact with the infected surface with touching of the face. Additionally, it also spreads through respiratory droplets released by coughs or sneezes (Peng et al., 2020). The symptoms of SARS-CoV-2 infection appear after an incubation period of approximately 5.2 days (Bai et al., 2020). The most common symptoms at onset of COVID-19 are fever, cough, and fatigue, while other symptoms include headache, haemoptysis, diarrhoea and lymphopenia (Ren et al., 2020; Huang et al., 2020; Wang et al., 2020).

The initial death cases of COVID-19 outbreak occurred primarily in elderly people, possibly due to a weak immune system that permits faster development of viral infection (Wang et al., 2020; Li et al., 2020a). Covid-19 attacks people with low immune systems and especially of under and over ages. The immune system is built on beneficial live bacteria that live in the gut which protect the human body from various diseases. When the immune system response is low, weak, or damaged it becomes an open invitation for infections such as coronavirus or other diseases (Arshad et al., 2020). So strengthening immune system naturally is the correct way to fight against this pandemic viral disease.

India is the mother land for medicinal herbs and spices. Out of 21,000 medicinal plant species listed by WHO, 2500 species were native to India. Hence India is considered as botanical garden of the world (Mahima et al., 2012). The herbal extracts contain a mixture of proteins, organic chemicals and carbohydrates which include alkaloids, flavoids, flavonoids, polyphenols, glycosides, saponins, and terpenes which possess potent antiviral potential including against SARS-CoV-2 (Quan et al., 2007; Dham et al., 2018; Tiwari et al., 2018; Ghosh et al., 2020; Bhowmik et al., 2020; Devansh, 2020; Gangal et al., 2020; Mani et al., 2020; Ngwa et al., 2020). Herbs and spices could be used as dietary or complementary therapy to prevent infection and to boost immunity (Dham et al., 2018; Tiwari et al., 2018). Although the detailed molecular mechanisms associated with spices and immunity are not fully understood, spice consumption plays a role in our ability to fight COVID-19 (Infusino et al., 2020; Panyod et al., 2020; Elsayed & Khan, 2020). Herbal extracts increase and help the intestinal beneficial bacteria, and the overall gut microbiome health which makes up to 85% of the body’s immune system. Herbal supplements used as immune boosters are taken for prevention of seasonal infections such as colds and flu (Daheshmeh, 2016). In addition, immune boosters are recommended as supplements to the people with weak immune system (Peltzer et al., 2008; Tiwari et al., 2018).

Herbs useful for the immune system can be categorized into 2 groups: (1) herbs for immune system maintenance and (2) herbs for the treatment of immune system disorders. The herbs listed in the first category are immunotonics. The phytoconstituents of those immunotonics are known to exert an overall balancing effect on the immune system. Immunomodulators may be defined as a substance of biological or synthetic origin which has the ability to stimulate, suppress or modulate any of the components of the immune system (Dham et al., 2015). The basic function of the immune system is largely to protect the individual against infectious agents and potential pathogens (Divya et al., 2020).

Leaves, roots, stems, flowers, barks and some other parts of medicinal and spice crops are used to prepare immunity boosting tonics. Some of the important tonics or extracts used as immunomodulators are Kabasura kudineer, Nilavembu kudineer, Immuplus, Echinacea liquid, Immusarc, Septilin and immunity plus (Tiwari et al., 2018; Mekala & Murtby, 2020; Krupanithi et al., 2020; Tripathi et al., 2020). The prime aim of this review is to highlight about the importance of herbs and spices as immunity boosters to get rid of diseases including COVID-19 and safeguard health during the ongoing pandemic.

2 Immunity booster's herbs and spices

2.1 Kabasura kudineer

It is an ancient siddha medicine prepared from fifteen herbal extracts (Table 1) of equal proportion. This tonic was found to contain alkaloids, carbohydrates, glycosides, cardiac glycosides, flavonoids, phenols, saponins, hydrolysable tannins and terpenoids whereas Nilavembu kudineer choornam possessed alkaloids, carbohydrates, glycosides, flavonoids, phenols, tannin and terpenoids (Pitchiah et al., 2020; Panyod et al., 2020; Mekala & Murtby, 2020).
2.2 Nilavembu kudineer

It is a polyherbal siddha formulation mainly consists of the king of bitter (*Andrographis paniculate*) and another 8 species of herbs (Table 2) (Christian et al., 2015). Nilavembu kudineer tonic contain alkaloids, carbohydrates, glycosides, flavonoids, phenols, tannins and terpenoids which are helpful in strengthening immunity and supports overall body health (Mekala & Murthy, 2020; Panyod et al., 2020).

| S. No. | Botanical name                  | Common name                            | Part              |
|-------|---------------------------------|----------------------------------------|-------------------|
| 1     | *Zingiber officinale*           | Ginger                                 | Rhizome           |
| 2     | *Piper longum*                  | Long pepper                            | Fruit             |
| 3     | *Syzygium aromaticum*           | Clove                                  | Flower bud        |
| 4     | *Tragia involucrate*            | Indian stinging nettle                 | Root              |
| 5     | *Anacyclus pyrethrum*           | Mount atlas daisy                      | Root              |
| 6     | *Hygrophila auriculata*         | Marsh barbel                           | Root              |
| 7     | *Terminalia chebula*            | Chebulic myrobalan                     | Fruit rind        |
| 8     | *Justicia adhatoda*             | Malabar nut                            | Leaf              |
| 9     | *Coleus aromaticus*             | Indian mint                            | Leaf              |
| 10    | *Costus speciosus*              | Creep ginger                           | Root              |
| 11    | *Tinospora cordifolia*          | Heart leaved moonseed or Giloy         | Leaf, Stem        |
| 12    | *Clerodendron serratum*         | Blue fountain bush                     | Root              |
| 13    | *Andrographis paniculata*       | Green chiretta or king of bitter       | Whole plant       |
| 14    | *Sida acuta*                    | Wireweed                               | Root              |
| 15    | *Cyperus rotundus*              | Nut grass                              | Root tuber        |

2.4 Echinacea liquid

*Echinacea purpurea* (Purple cone) stimulates the immune system, leading to renewed interest for treating immune deficiencies, “boosting” immune systems during periods of stress or pandemic, anxiety and inflammation. It has ability to mobilize leukocytes, activate phagocytosis and stimulate fibroblast formation. It is used to relieve problems of respiratory tract (Manayi et al., 2015; Divya et al., 2020).
2.5 Immusarc

It is a herbal preparation from Withania somnifera and Emblica officinalis that helps to achieve optimum immune effectiveness (Chikhale et al., 2020; Tripathi et al., 2020).

2.6 Septilin

Septilin is made of Conniphora wightii (Bellow tree), Glycyrrhiza glabra (Licorice), Tinospora cordifolia (Gilot), Rubia cordifolia (Indian madder), Moringa pterygosperma (Drumstick) and Emblica officinalis (Amla) (Bailly & Vergoten, 2020; Daswani & Yegnanarayan, 2002). Septilin’s immunomodulatory, antioxidant, anti-inflammatory and antimicrobial properties are beneficial in maintaining general well-being. It helps in elevating the body’s resistance to infection. Septilin stimulates phagocytosis (elimination of bacteria through ingestion) by macrophage (white blood cells) activation, which combats infection. It is also beneficial in respiratory tract infections including chronic tonsillitis, pharyngitis, chronic bronchitis, nasal catarrh (mucous membrane inflammation of the respiratory tract) and laryngitis (Sandeep et al., 2011; Krupanidhi et al., 2020).

2.7 Immunity Plus

It is prepared from Echinacea purpurea (Purple cone), Hypoxis hemerocallidea (Africanpotato), Agathosma betulina (buchu), Mentha piperita (Peppermint), Solidago virgaurea (Wound wort), Viscum album (mistletoe), Crataegus oxycanthoides (Hawthorn), Schizandra chinesis (Five flavor berry), Astralaugus membranaceus (Milkvetch), Olea europae (Olive leaf) and Propolis (Hlengwa et al., 2020). This affect various CYP enzymes including CYP3A4 and CYP2C9 and strengthens immune system (Awortwe et al., 2015; Elsayed & Khan, 2020).

The above mentioned immune boosters act as immunomodulators or immunonutonics. But to maintain immune system perfectly for longer period we need to take well-balanced, healthy diet which consists of medicinal herbs, vitamin A, C, D and E rich foods (Rahal et al., 2014; Chen et al., 2020; Panyod et al., 2020). Natural product-derived phytochemicals, herbs, ayurvedic and traditional medicines are gaining importance owing to their promising anti-SARS-CoV-2 potential (Donna & Donna, 2020; Gangal et al., 2020; Gupta et al., 2020; Jahan & Onay, 2020; Li et al., 2020b; Mani et al., 2020; Rastogi et al., 2020; Xu & Zhang, 2020; Zhang et al., 2020a, 2020b).Avoiding junk food is much important to maintain overall health and immunity (Join & Calendar, 2020). Also, proteinaceous foods are must in the daily diet (Hyman, 2020).

Conclusion and future view

Coronavirus is mostly affecting the people with low immune power and with multiple diseases like Diabetic mellitus and respiratory disorders. Even though there are different ex-situ approaches to prevent the infection of corona virus viz., use of masks, sanitizing body and surfaces and maintaining social distance. But apart from them, in-situ prevention approaches like inclusion of nutrient rich healthy food and herbs in daily diet helps to protect the body from inside. Herbal extracts of medicinal crops and spices like Kabasura kudineer, Nilavembu kudineer, Immuplus, Echinacea liquid, Immusarc, Septilin and immunity plus helps in maintaining immunity and also in proper functioning of the body. In this view apart from normal healthy diet which contains more proteins, vitamins and minerals we have to supplement our body with the above mentioned immunity boosters to fight against not only COVID-19 but also other diseases.

Author contributions

All the authors substantially contributed to the conception, compilation of data, checking and approving the final version of the manuscript, and agree to be accountable for its contents.

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