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A COMPREHENSIVE REVIEW ON VYADIKSHAMATVA AGAINST THE PANDEMIC, COVID 19

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ABSTRACT

The immune system is one of the complex and nature's most fascinating invention. Phagocytes, granulocytes, T cells, B cells, natural killer cells are the cells help to boost immunity. The medicinal properties of various herbs like ashwagandha, Tulsi, turmeric, ginger, neem, guduchi help to fight with disease causing microbes. If we suffer sickness and disease, it means our immune system is not working properly. Medicinal herbs give defence against infecticious organisms and other invader. This review article gives an overall view including biological source, microscopic characters, chemical constituents and specially uses as immune booster for herbs like Emblica officinalis (Amla), Withania somnifera (Ashwagandha), Syzgium aromaticum (Clove), Ocimum sanctum (Tulsi), Curcuma domestica (Turmeric), Cinnamomun verum (cinnamon), Azardirachta indica (Neem), Piper nigrum (Black pepper), Zingiber officinale (Ginger), Panax quinquefolius L.(Ginseng), Tinospora cordifolia (Guduchi) for their strong immunostimulatory activities.

KEYWORDS:- Immunity booster (Vyadikshamatva), medicinal plants, pharmacological activities, antioxidant, anti-inflammatory.

INTRODUCTION[2,9]

Immune system:- Immune system also known as defense system because of body defense against infectious diseases or disorders. Immune system protects the body and it is made up of cells, tissues, and organs. Leukocytes are mainly involved in an immune system. Thymus, macrophage, B-cells, T-cells, bone marrow, spleen, lymph nodes are various parts of the body which are included in the immune system.

Various cells are involved in immune system:- T-cells, B-cells, cytokines, natural killer cells, macrophages play a key role in the immune system. Foreign invaders are engulfed and digested by phagocytes which are large white cells.

B-cells:- In the adaptive immune system B-cells are essential cells. These cells are lymphocytes which have an important function in humoral immune response. B-cells produce antibodies against antigens and develop memory B-cells hence, these cells are important cells of the adaptive immune system.

T-cells:- T-cells are lymphocytes which develop from stem cells in the bone marrow. T-cells protect the body from infections and fight against cancer. These cells of the immune system play a central role in the adaptive immune system.

Macrophages:- Cells are versatile in the macrophages. These cells are found in tissues throughout the body and also neutrophils. Macrophages are also known as scavengers. They are essential to activating T-cells.

Natural killer cells:- Natural killer cells are lymphocytes and about two types of lymphocytes are killer cells that are natural killer cells and cytotoxic T-cells. Granules filled in natural killer cells and cytotoxic T-cells with potent chemicals. When both types of cells come together they kill on contact.

Cytokines:- Cytokines are also called interleukin. The primary function of cytokines is to regulate inflammation. There are anti-inflammatory as well as pro-inflammatory cytokines. Cytokines Play a central role in regulating immune response against foreign pathogens or infections. It is secreted by T-cells and B-cells of the immune system.

General immune response:- General immune system recognizes pathogens and tries to attack and destroy the substances which contain antigens. It gives such as inflammation as well as non-specific cellular response. Immune cells actively bring inflammatory response to part of infections by increasing the flow of blood to the area.

Types of immune response

Innate immunity:- Innate immune system defenses against infections. Innate immunity system consists of defense mechanisms, general immune response and also physical barriers. Innate immunity also known as non-specific immunity is the defense system with which you

were born. This system consists of barriers to keep the bacteria, parasites, viruses, pathogens or foreign particles out of the body.

Adaptive immunity:- Adaptive immunity occurs after contact to an antigen either from pathogens or vaccination. Adaptive immune system also known as acquired immune system. This system consists of systemic cells, specialized cells and that eliminate pathogens or foreign particles from out of the body. Adaptive immune system also called a specific immune system which works to heal as well as protect the body if the innate immune system fails to work. The response of the adaptive immune system is found only in the vertebrates.

Passive immunity:- Passive immunity occurs due to immunity gained from someone else and we are protected from pathogens or foreign particles. In this immunity gained from another body in the form of antibodies. The mother's milk contains antibodies hence immunity derived through mother's milk. Transferring the maternal antipathogen antibodies to developing fetus through umbilical cord. Also by artificially passive immunity gained from antivenom antibodies.

Ginseng [Panax ginseng][2,14]

Synonyms: Asiatic ginseng, Chinese ginseng, five fingers.

Biological source: Dried form of roots of panax ginseng, family: Araliaceae.

Microscopic characters: Microscopic characters of ginseng consist of leaf structure which is known as panax species. Surface structure of cuticle layer, stomata and thylakoids are observed through microscopy.

Colour: Leaves – green, plant – yellowish or green.

Odour: Earthly smell

Taste: Aromatic with sweet smell.

Size: Plant - 1 foot

Shape: Flower – umbrella shaped, seed – wrinkled, roots – human like form, leaves – oval.

Fig: Panax ginseng.

Uses: The major active constituents in ginseng are triterpenoid glycoside which is also known as ginsenosides. Ginsenosides are present in roots, leaves, stems, flowers, buds and berries. Ginseng has an immunomodulatory property. Ginseng and its constituents have beneficial effects on CNS disorders. Ginseng increases the immunity against acute respiratory tract infection.

Haritaki [Terminalia chebula][15,16]

Synonyms: Indian walnut, Harad, Shilikha.

Biological source: Dried mature fruit of terminalia chebula Retz. Family: Combretaceae.

Microscopic characters: Microscopic characters of haritaki consist of epicarp which is tangentially elongated and transverse section of pericarp. Through microscopy, starch grains, calcium oxalate crystals, rosettes, and stone cells were observed.

Colour: Dark brown.

Odour: Characteristics.

Taste: Astringent.

Size: 2-4.5 cm long and 1.5-2.5 cm wide.

Shape: Elliptical or oblong in shape.

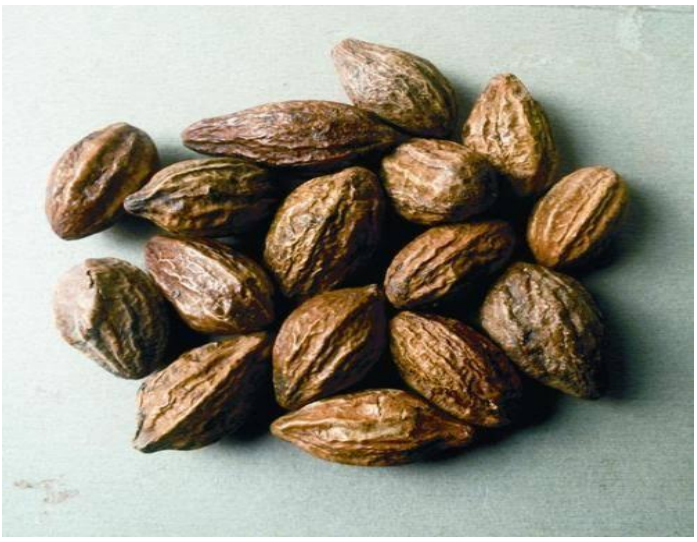

Fig. Terminalia chebula.

Uses: Terminalia chebula consists of anthraquinones, tannins (30-40%), esters of palmitic, oleic and linoleic acids also resins, gallic acids as chemical constituents.

Haritaki is a good herb which helps in increasing immunity. It promotes longevity after the regular consumption of terminalia chebula with other herbs and it boosts energy. Haritaki

fruit has nutritional importance and it helps in strengthening the nervous system to boost immunity. It contains a lot of vitamins, minerals and proteins which help to improve immunity.

Black pepper [Piper nigrum][1,10]

Synonyms: Golmarich, Kali mirch, Milagu-milagu.

Biological source: Dried unripe fruit of piper nigrum Linn. Family: Piperaceae.

Microscopic characters: Microscopic characters of black pepper consist of External epicarp, mesocarp and endocarditis containing stone cells. Epicarp consists of tabular cells, mesocarp consists of elongated parenchymatous cells and endocarditis which are made up of beaker shaped stone cells in row.

Colour: Grey's black in colour.

Odour: Aromatic, pungent, slightly musty.

Taste: Spicy, warm in taste.

Size: 3.5-6 mm in diameter.

Shape: Globular in shape.

Fig. Piper nigrum.

Uses: Piper nigrum consists of pipeline, piperidine, piperettine, chavicine as alkaloids. 1-10% volatile oil (phellandrene, caryophyllene, pinene, camphene, piperonal), resins, starch (30%) and carotene.

It is used as a stimulant. It has anti-inflammatory and antibacterial properties to boost up the immune system against infectious diseases. Black pepper is usually used for GIT diseases to relieve and gain immunity against infections.

Ashwagandha [Withania somnifera][1,9,12]

Synonyms: Indian winter cherry, Indian ginseng.

Biological source: Ashwagandha is a small, woody shrub. Family: Solanaceae

Microscopic characters: Microscopic characters of ashwagandha consist of cork cells, starch grains, small vascular bundles, and secondary tissues in maturated roots.

Colour: Roots – Whitish brown, Leaves – Green, Fruit – Red, flower – pale green, seeds – yellow.

Odour: Horse like odour.

Taste: Bitter, pungent and sweet.

Size: Leaves – 5 to 10 cm long and 5 cm wide, shrub – 35 to 75 cm.

Shape: Leaves – ovate, glabrous.

Fig: Withania somnifera.

Uses: The biologically active constituents present in Ashwagandha are alkaloids, anaferine, cuseohygrine, anahygrine, steroidal lactones and saponins. 5 – hydroxy withanolide R and withasomniferin A is yielded by aerial parts of Ashwagandha.

Ashwagandha is considered as a rejuvenator, healthy tonic and useful in various health problems. Ashwagandha acts as an immunoregulatory and a chemical protective agent. In mice, the powdered form of root extract of Ashwagandha increases the total white blood cell count. Ashwagandha improves the cell mediated immunity.

Guduchi [Tinispora cordifolia][1,2,4,11]

Synonyms: Giloy, Amrita, Amritavalli, Madhuparni, guduchika, cinnobhava, vatsadani, tantrika

Biological source: Dried form of bark, stems and roots. Family: Menispermaceae

Microscopic characters: Microscopic characters of guduchi consist of starch grains, crystal fibers, tracheids, cork cells and lignified cells.

Colour: Bark – creamy white to grey, Flower – yellow or greenish yellow, Stem – Young stem = Green, Older stem = Slightly brown, Fruit – Red colour after ripening

Odour: Characteristics

Taste: Sweet – Madhura, Sour – Amla, Salty: lavana, Bitter: Tikt

Size: Leaves - Up to 15 cm, Stem – Young stem = 0.6 to 5 cm, Older stem = up to 2cm, Flower – 2mm

Shape: Leaves - Heart shaped, Fruits – Ovoid shaped

Fig. Tinispora cordifolia.

Uses: In Tinispora cordifolia a large number of chemical constituents have been isolated. Such as alkaloids, terpenoids, phenolics, steroids, essential oils, aliphatic compounds, polysaccharides and others. Tinispora cordifolia herb stem has higher alkaloid content than in leaves.

Amrita Bhallataka shows the immunomodulating activity. For improving immunity, fresh guduchi juice is beneficial. The alcohol and water extract of guduchi has a good impact on the immune system.

On guduchi shrub extract, various studies State's that it could cause crucial enhancement in IgG antibodies in the serum and macrophages activation and initiation of cell regulated immunity. The polysaccharides of Tinispora cordifolia are immunomodulating in nature.

Cinnamon [Cinnamomum verum][1,7]

Synonyms: Cinnamon bark, kalmi-dalchini, ceylon cinnamon.

Biological source: Dried inner bark of the shoots of compiled trees of cinnamomum zeylanicum Nees, family: Lauraceae.

Microscopic characters: Starch grains, stone cells, phloem fibers, calcium oxalate crystals, and oil cells are microscopic features of cinnamomum verum.

Colour: Outer surface dull yellowish-brown and inner surface darker in colour.

Odour: Cinnamon has a fragrant aromatic odour.

Taste: Aromatic, warm and sweet taste.

Size: Length upto 1m and 1-2 cm in the diameter and in thickness about 0.5 mm.

Shape: Compound quilled pieces in shape and closed packed occurs in single or double quillsor.

Fig. Cinnamomum verum.

Uses: Cinnamomum verum contains terpenes, cinnamic aldehyde (55-65%), mucilage, volatile oil (0.5-1%), Eugene (4-10%), starch, calcium oxalate, tannin, as a chemical constituents.

It has antibiotic properties which are essential to develop the immune system. Cinnamon performs antifungal, antioxidant, antimicrobial, effects as well as boosts the immune system against infections. Cinnamon shows immunomodulatory functions. It is well known as an immune stimulator.

Neem [Azadirachta indica][1,8]

Synonyms: Nimb, mar.-Limba, ooriya-Nimba

Biological source: Fresh or dried leaves and seed oil of Azadirachta indica J. Juss (Melia Indica or M. Azadirachta Linn.) Family: Meliaceae.

Microscopic characters: Leaflet, apex, stalk, exstipulate are the microscopic features of azadirachta indica.

Colour: Dark green in colour.

Odour: Typical odour.

Taste: Bitter in taste.

Size: 3-6 cm long slender petioles.

Shape: The arrangement of leaflets in alternate or opposite patterns.

Fig. Azadirachta indica.

Uses: Azadirachta indica contains nimbin, nimbandiol, nimbinene, 6-desacetyl nimbinene, nimbolide, as chemical constituents.

Usually, neem is a herbal medicinal plant which has properties of blood-purifying and to boost up the immune system. It is also effective for high fever, dengue, and other infectious diseases for developing immunity.

Clove [Syzgium aromaticum][2,3,10]

Synonyms: Lavang, caryophyllum.

Biological source: It is obtained from dried flower buds of Eugenia caryophyllum of family myrtaceae. It contains not less than 15 % v/w of clove oil.

Microscopical characters: Microscopic characters of clove consist of epidermal surface, cuticle, vascular bundles, pericyclic fibers, oil gland and cluster of calcium oxalate crystals. Slightly above the epidermal surface anomocytic stomata were observed.

Colour: Dark brown or crimson red.

Odour: Pungent, aromatic.

Taste: Spicy pungent taste.

Size: about 10 -17 mm long and 2.5 mm in thickness.

Fig. Syzgium aromaticum.

Uses: Clove is a very useful aromatic herb rich in volatile compounds and antioxidants. It is a rich source of eugenol beta caryophyllene, alpha humulene, vanillin, tannins, and methyl salicylate (painkiller). Ingestion of whole cloves perfectly boosts the immune system.

Clove essential oil has lots of nutritional, therapist properties which includes antioxidant, antimicrobial, antifungal, anti-inflammatory and most important is an immune booster. Post binding entry of severe acute respiratory syndrome (SARS) caused due to coronavirus is also inhibited by clove essential oil.

It may be considered that clove essential oil combats the coronavirus, enhances immunity and gives protection against sudden death seen in some patients infected by coronavirus, arising

from embolism related with hypercoagulable formation. Cloves show resistance to disease, purify the body and thereby boost immunity.

Amla [Emblica officinalis gareth][1,5]

Synonyms: Myrobalan, Indian gooseberry.

Biological source: This consists of dried, fresh fruits pericarp of the plant phyllanthus emblica Linn., emblica officinalis, belonging to family euphorbiaceae.

Microscopical characters: Microscopic characters of amla consist of starch grains, parenchymatous cells, crystals of calcium oxalate, sclereid and group of lignified fibers.

Colour: Fresh green

Odour: Odourless

Taste: Sore and astringent.

Size: 2 to 3 cm in diameter.

Fig: Emblica officinalis.

Uses: Amla is a herb, which is the richest source of vitamin c having great elementary and therapeutic importance. Vitamin c (ascorbic acid) glutamic acid, aspartic acid, praline, gallic acid, tannin and other minerals and amino acids are the constituents of Amla.

Amla is one of the energy promoters as it tones up the functions of all the body organs.

Amla increases RBC and WBC count and strengthens immunity.

Amla is one of the major constituents of chyawanprash which is marketed as an immunity booster. As amla shows a valuable effect on cough, bronchitis and asthma it has more

importance in the pandemic situation as a home remedy to boost immunity. Amla powder gives physical strength by improving immunity.

Tulsi [Ocimum sanctum][1,3,5]

Synonyms: Sacred basil, kali-tulsi.

Biological source: Tulsi obtained from the dried and fresh leaves of ocimum species like ocimum sanctum L. And ocimum basilicum L. of family labiatae.

Microscopical characters: Microscopic characters of tulsi consist of calcium oxalate crystals, lignified fibers, trichomes, oil globules, stomata and annular vessels.

Colour: Leaves are green in colour, seeds are reddish black, flowers are purplish.

Odour: Strongly aromatic.

Taste: sometime bitter, astringent

Size: 30 to 80 cm height.

Fig. Ocimum sanctum.

Uses: Different parts of Ocimum sanctum have been recommended for treatment of various diseases in the traditional system of medicine. Tulsi is loaded with vitamin C, methanol, ursolic acid, carnosol, rosmarinic acid, eugenol which are essential for its medicinal properties.

The antibacterial, antiviral, antioxidant, anti-aging immune boosting potential of Tulsi has been proven by scientific study. Tulsi is a natural stimulant which energizes our body.

Methanol, a constituent of ocimum sanctum, is an antiviral agent that boosts the immunity and helps to defend against the terrifying bacteria and virus. Methanol extract of Tulsi leaves work as an immune modulator and regulator by increasing T-helper and NK cells which boost immune response and increase vital capacity.

Turmeric [Curcuma domestica][2,3,4]

Synonyms: Curcuma, Indian saffron.

Biological source: Turmeric is obtained from the rhizome of species curcuma longa, belonging to the family zingiberaceae.

Microscopical characters:- Microscopic characters of turmeric consist of cork cells, trichomes, fragments of parenchymatous cells, oil droplets and clumps of gelatinized starch.

Colour: Golden-yellow powder.

Odour: Aromatic, pleasant.

Taste: Pungent and aromatic.

Size: up to 4 cm and thickness 3 cm

Fig. Curcuma domestica.

Uses: The main bioactive constituent of turmeric is curcumin, which is anti-inflammatory in nature. To improve immunity AYUSH recommended a kadha (decoction) made from grated ginger, turmeric, and Tulsi once daily. Turmeric powder is also taken with milk.

Apart from curcumin, diterpenes, lipid, vitamin, minerals, sesquiterpenes, triterpenoids are the active components of turmeric and various immunomodulatory not only dendritic cells, macrophages and both b and t lymphocytes, but also cytokines, which are molecular

components involved in the inflammatory processes are responsible for immunomodulatory abilities of curcumin.

Relieving and preventing effect has been shown by curcumin on the respiratory disorder hence for the condition like covid-19 turmeric is strongly recommended as a home remedy to boost immunity.

Ginger [Zingiberofficinale roscoe][3,13]

Synonyms: Zanjabeel, Adrak, sunth.

Biological source: Rhizomes of ginger are mostly used. Family: Zingiberaceae.

Microscopic characters: Microscopic characters of ginger consist of outer cortex and inner cortex, cork cells, transverse section of rhizome shows cork tissue, vascular bundles contains xylem and sieve tubes, parenchymatous cells.

Colour: Rhizomes – yellow, white or red, Flower – yellow.

Odour: Aroma, pungent.

Taste: Slightly peppery

Size: Rhizomes – 5 to 15 cm long, 1.5 to 6cm wide and 2cm thick. Stem – 12 inches.

Shape: Rhizome : irregular shape.

Fig: Zingiberofficinale roscoe.

Uses: The major active constituents present in ginger are gingerol, shogoals, zingiberene and zingerone and other less compounds, also includes the terpenes, vitamins and minerals. They have pharmacological activity against natural, chemical and radiation induced toxicities.

CONCLUSION[9]

These are the best ways for improving immunity. Practically medicinal plants play an immunomodulatory role in developing the immune system. Prevention is always better than cure. Traditionally, these plants have various benefits, which helps in today's life.

In treatment of cold and cough, fever, inflammation and viral disease these herbs are used. The medicinal plants like tulsi, turmeric, clove, amla, neem, cinnamon, black pepper, guduchi, ashwagandha, ginger and ginseng have a low cost also easily available and have the potential to enhance the immunity to fight against covid -19.

These plants have various benefits, which are used in day today life. The traditional remedies increase when conventional medicine is ineffective. They play an important role to become healthy and fit in India and World.

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