

A brief review on some natural sources containing immune-boosting nutraceuticals

Rajani Singh

Chemistry Department, T.D.P.G. College, Jaunpur-222002, U.P. (India)

Email : drssingh20.ss@gmail.com

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Abstract : The covid-19 pandemic has gripped almost all the countries of the world. Enormous of people were killed around the globe. Though the preventive vaccines have been developed, but the drugs with high efficacy are still not available to cure Covid-19 infections. Thus there is only the option to have strong immune system of body to protect from the infections caused by invaders. Thus fruits, vegetables, spices and other herbal product loaded with healthy nutrients must be included in our diet to boost the immunity. In this brief review we focus on the uses of healthy nutrients. The phytochemicals available from natural source enhance our immunity.

(Keywords : Immune-boosting, Nutraceuticals, Anti-oxidant)

Introduction

The strong immune system protects the body from infections caused by invaders like bacteria, fungus, virus etc. The Covid-19 infection affect the respiratory system. The life threatening infections of corona virus reduce our immunity and may readily deteriorate the health. The people with strong immunity may easily fight against infections caused by pathogens. The immunity is capability of body to protect from infections caused by pathogens. Antibodies, white blood cells, thymus, lymphatic system and bone marrow are the organs of immune system. The immunity is of mainly two types. The innate immunity inherited from parents provides primary protection of body. It is already present in body. Adaptive immunity is developed after exposure to antigen and generates antibodies. The response of adaptive immunity is much more rapid than innate immunity response. When Covid-19

has created havoc on the human being, the immunity becomes most important factor for normal health.

The medicinal herbs and their products possessing anti-inflammatory, antiviral, antioxidants properties may be used to enhance immunity. This review includes important number of natural sources and their chemical constituents for the prevention of various infections and making strong immunity. Ministry of Ayush has recently suggested using Kadha drink as immunity booster.

The positive role of vitamins and minerals has been shown to increase performance of immunity¹. Vit-D is fat soluble and it has major role in immunity response. It also as an antioxidant control immunological response². Zinc as a trace element present in diet manages immunity against all types' viral infections. Vit-E from some sources manages immune response³. The copper has been reported for the growth of immune cells⁴. Selenium⁵ has been reported to have anti-inflammatory and antioxidants properties⁶.

Magnesium has been reported immune modulator against viral infection⁷. The antioxidant, anti-inflammatory and antimicrobial properties of Jamun fruit are more encouraging. The flavonoids and phenolics are its main ingredients which boost immunity⁸. Watermelon is packed with vit.-C, A and B6 which enhance our immunity⁹. Pineapple is a rich source of vit.-C which enhances immunity¹⁰.

Onion is also a rich source of selenium, sulphur compounds, zinc and vit.-C which boost immune system¹¹. Broccoli is loaded with trace element like zinc and selenium which helps to our immune system¹². The extract of flowers Echinacea purpurea has been reported to possess immune regulatory and antiviral activity¹³.

A natural glycoprotein Lactoferrin activates T-cells and thus result antioxidant effect and manage immune system¹⁴. Honeybee's make propolis from poplar trees which have been reported to show anti-inflammatory and immuno regulatory effects¹⁵. Vit.-C, potassium and folic acid present in citrus fruits improve our immune system¹⁶. Pomegranates contain Vit.-C, vit.-E and enhance our immunity and protect from severe infections. It produces antibodies rapidly¹⁷. Cauliflower's chemical ingredients glutathione, choline, Vit.-K, vit.-C, manganese, protect body from different infections by reducing stress and increasing immunity¹⁸. The number of cells fighting the infections and also T-cell are increased by β -carotene, Vit.-A, vit.-C etc. present in carrot¹⁹. Keeping all above facts in view we focus our attention to the following easily available natural sources (vegetables, fruits, spices and several herbs) loaded with immune boosting nutrients and phytochemicals:

1. **Spinach (*Spinacia oleracea*):** It is nutrient rich vegetable. Spinach is packed with antioxidant like carotenoids, vitamins (C, E, K, B6, B9), flavonoids and phenolic compounds and help to increase the antioxidant activity by scavenging free radicals²⁰. It is rich source of iron, copper, phosphorus and β -carotene which increase fighting ability of our immune system against infections²¹.

2. **Tomato:** Tomato used as vegetable is rich source of vitamins (A, C, B & K) and folate etc. The lycopene, phylotene, β -carotene and poly phenols (Flavonoids, flavones and flavonones) are also the significant chemicals presented in tomato²². The immune response is regulated by carotenoids present in tomato²³. The antioxidants, β -carotene, vit.-C and vit.-E present in tomato

protect the white blood cells from free radicals which can affect the immune system²⁴.

3. **Brussel sprouts:** It is rich source of vitamin-C which protects body as antioxidant and is helpful in boosting our immunity against viral infections²⁵.

4. **Ginger (*Zingiber officinale* Roscoe):** Ginger is loaded with rich nutrients. It has been used as medicine for a long time. Zingiber contains mainly terpenoids and phenolic compounds²⁶ (zingierols, shogaols, paradols). The β -bisabolene, α -curcumene, zingiberine etc. are the main terpene compounds present in ginger²⁷. Ginger has been reported to show antioxidant²⁸, antimicrobial²⁹, anti-inflammatory³⁰ properties. Ginger is perfect immunity booster as it is loaded with active ingredient gingerol. Thus strong inflammatory and antioxidant activities of ginger help to boost our immunity.

5. **Turmeric (*Curcuma longa* Linn.):** Turmeric is the healthiest medicinal spices used in India. It possesses antiviral, anti-inflammatory and antioxidant activities³¹ which shows its immune boosting and anti Covid-19 effects. The turmeric is loaded with curcumin, demethoxy curcumin, and bisdemethoxy curcumin³². It also contains α , β -pinene, myrcene, limonene, linalool and methylpropanol³³. Arora³⁴ has reported that curcumin fights against cough, flu etc. Turmeric contains calcium, potassium, riboflavin, niacin, ascorbic acid³⁵ etc. which help in boosting our immunity.

6. **Garlic (*Allium Sativum* L.):** We generally use garlic in our food. Garlic is loaded with azoenes, allicin, alliin and diallyl trisulphides³⁶. Garlic is a rich source of vitamin B, C, B6, amino acids, copper, calcium fibre, zinc etc.³⁷. The sulphur containing compounds in high concentrations are present in garlic and thus it enhances immunity³⁸. Garlic has antibacterial antiviral and antifungal properties³⁹. The diallyl trisulphide has been reported to increase activity of NK-cell. The virus infected cells are destroyed by NK-cell⁴⁰. The antioxidant activities are increased by regular use of garlic⁴¹ which reduces the formation of oxygen free radicals.

7. **Tulsi (*Ocimum sanctum*):** Tulsi is planted and worshiped regularly almost in all homes, considering the presence of goddess Lakshmi in the form of this plant. The Kadha of Tulsi leaves is used for relief from cold and cough. This herb is loaded with chemicals like oleanic acid, ursolic acid, eugenol, rosmarinic acid, carvacol, linalool, β -caryophyllene⁴² etc. Vitamins (C, A), calcium, zinc, iron and other phyto nutrients are present in Tulsi⁴³. The extract of this plant is rich source of alkaloids, phenolics and flavonoids which enhance immunity response and develop resistance against pathogens⁴⁴. It has anti-microbial⁴⁵ and anti-oxidant⁴⁶ activities. It is considered as a best medicinal herb on the earth. Its extract helps the T-cells and natural killer cells and thus it boost our immunity system. When we take Tulsi leaves in empty stomach, overall immunity is improved and we become safe from flu and viruses⁴⁷.

8. **Giloy (*T. cordifolia*):** It is also called as Guduchi and is used as medicine since ancient time. It contains alkaloids, steroids, glycosides and polysaccharides⁴⁸. Giloy has been reported to have antioxidant and immunomodulatory properties⁴⁹. Its chemical constituents stimulate T-cells, B cells and NK cells and thus enhance immunity⁵⁰. The regular consumption of Giloy increases antibody producing cell and WBC which make our immunity very strong⁵¹. It releases toxins from our body and oxidative damage is controlled by its use.

9. **Ashwagandha (*Withania somnifera*):** Ashwagandha is well known Indian medicinal plant also known as Indian Ginseng. *W. somnifera* contains biologically active chemicals like alkaloid, steroidal lactones, saponins and withanolides⁵². The catechin (major polyphenol) is present in high concentration and shows anti-oxidant activity⁵³. Ruchi Tiwari⁵⁴ and others have reported that *W. somnifera* chemical constituents enhance the nitric oxide synthetase activity of macrophages. The microbial killing power of immune cell is increased and thus immune response is increased. Being rich in amino acids and bases of nucleic acid, it reduces stress and

thus considered as booster of immune system. The antibodies are very much produced by the use of Dabar Ashwagandha⁵⁵.

10. **Black Peeper:** Black peeper is rich source of potassium⁵⁶, calcium, phosphorus, iron, copper, zinc, sodium etc. It also contains α , β -pinene, myrcene, limonene, linalool, methyl propanal, butyric acid⁵⁷ etc. Its active compounds activate WBC which becomes very much active to fight against bacteria and viruses⁵⁸. Its immunomodulatory action is very important⁵⁹.

11. **Amla:** It is richest source of ascorbic acid, alkaloids, amino acids, emblicanin A and B⁶⁰, zinc, copper and iron. The combined effect of ascorbic acid, polyphenols and flavonoids make it a strong antioxidant⁶¹ which boost immunity. The function of WBC and antibody response is enhanced by ascorbic acid. Thus vit.-C present in Amla makes strong immunity. Hence we may consider Amla as absolute food.

12. **Fenugreek:** It is a rich source of alkaloids, flavonoids, amino acids, fibers, polyphenols and saponins⁶² etc. The leaves contain carotene, thiamine, niacin, vit.-C, riboflavin and minerals calcium, zinc, phosphorus⁶³. Naidu *et al.*⁶⁴, have reported its anti-oxidant activity by free radical scavenging. It shows antimicrobial activity⁶⁵ and makes the strong immune system.

13. **Cinnamon:** Cinnamon is widely used as spice since thousands of years. It is a rich source of cinnamon aldehyde, cinnamon acetate, eugenol, L-borneol, caryophylline, E-nerolidol, α -terpeneol, terpenolene⁶⁶ etc. Procyanadins obtained from cinnamon shows antioxidant activity⁶⁷. Its essential oils are reported to have antimicrobial and anti-oxidant properties antioxidant and free radical scavenging properties are shown by different flavonoids present in cinnamon⁶⁸. Thus cinnamon is very much useful to boost our immune system⁶⁹.

14. **Moringa:** It has very high nutrition value. It contains ten times more Vit.-A than carrots⁷⁰. *M. Oleifera* is loaded with vitamins (A, B), folic acid, vitamins (C, D, E), pyridoxine, nicotinic acid etc.⁷¹. Minerals⁷² like calcium, zinc,

potassium, magnesium, iron and copper are present in Moringa. Moringa leaves are loaded with phytonutrients which increases the number of WBC and levels of immuno globin⁷³.

Green Tea: Major chemical component present⁷⁴ in green tea are catechins, caffeine, thiamine, vitamins (C, B), folic acid, β -carotene, vitamin E and saponins. Green tea contains minerals like potassium, calcium zinc, copper, magnesium etc. The antioxidants vit.-C, vit.-E, catechins present in green tea protect our immunity and boost our cells⁷⁵.

Conclusion

The strong immunity system of our body is the primary defense system against any type of infection caused by foreign invaders. The Covind-

19 infection has become life threatening pandemic. Though preventive vaccination is in progress but we must focus primarily to enhance our immunity by the intake of nutraceuticals from natural sources. We come to the conclusion that nutrients and phytochemicals from natural sources have no or very much lesser side effects. Hence to improve immune system of body, we must include nutraceuticals from natural sources in our daily diet. Further it is very much essential for everyone to have a healthy life style which involves consumption of freshly cooked nutritious food, no smoking, no alcohol intake, adequate sleep, regular exercising and yoga to avoid stress, strain and tension. Further we must keep our body always hydrated by drinking daily 10-12 glasses of water. Finally it is advisable to lead healthy and happy life always with positive thoughts.

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