



IMMUNE MODULATORY EFFECT OF AYURVEDIC MEDICINAL PLANTS IN MANAGEMENT OF HEALTH AND DISEASE

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Traditional herbs have proved to be quiet effective in prevention as well as management of health and disease. Natural herbal remedies formulated by incorporating various plant extracts have up surged as next generation medicinal alternative. Primary health care issues are till date addressed by such formulations in developing country like India. Traditional Ayurvedic Indian medicinal system continues the eldest and ancient one but also living tradition based on experimental evidences. Ayurveda is a science of life company of holistic approach to health and personalized medicine. It is also known to be a perfect medical system that comprises psychological, physical, ethical, spiritual health, and philosophical. In this, every cell is considered to be inherently an important expression of original intelligence hence it is called a self-healing science. These medicinal plants have important position in Ayurveda and are very beneficial because all herbs have many different types of properties which help prevent chronic and severe diseases. Medicinal Plants boost immunity power, maintain the metabolism and prevent infections. They have many properties such as antioxidant, anti-inflammation, anti-viral, anti-aging, anti-cancer, etc and India being highest Medicinal plants producing country in Globe.

Key Words: Ayurveda, Antiviral, Antibacterial, Immune modulatory effect and Medicinal plants.

Introduction

A substance either biological or synthetic in nature which helps in stimulation, modulate or suppress some components of immune system like changes in response of immunity can be considered as immune modulator. Modulation of Immune System refers to change in response which involves amplification, induction or expression of immune response. According to Ayurvedic literature too certain naturally occurring compounds in medicinal plants hance bioactive compounds with antioxidant properties exhibit immunomodulatory actions this potential therapeutic efficacy. Ayurveda, the term originated from Sanskrit words "Ayur" which means "life" and

"Veda" which means "science of Knowledge", is a natural procedure of medicine that was designed in India approximately more than 3,000 years ago. It also means that Ayurveda summarizes the learning of life. It is established on the idea that diseases happen due to stress and imbalance in the consciousness of a person. It stimulates certain natural therapies as well as lifestyle interventions to regain the balance between the mind, environment, body, and spirit¹. Ayurveda provides a foundation for appropriate health and wellbeing by ensuring prevention and management of diseases. Many treatments popular in Ayurveda include meditation and personalised nutrition. In Ayurveda, take an

example of turmeric being a herb derived from the turmeric plant is *Curcuma longa* is commonly used by Ayurvedic practitioners is a potent source of calcium, beta-carotene, zinc, iron, potassium, niacin, flavonoids and have proved to be beneficial in prevention of many types of viruses. These Ayurvedic herbs are very important for maintaining good health and preventing many types of diseases because of certain specific properties such as anti-inflammatory, anti-bacterial, anti-virus, anti-ulcer, anti-cancer, and so on².

Material and Methods

PRISMA technique was employed for designing methodology to prepare the Review paper and the specific steps followed include identification of reviews

followed by their screening done by relating the title and abstract of identified papers with the title of Review paper. Databases searched included Cochrane Library, Medline, Scopus, Health Internetwork and Science Direct. Certain keywords used for searching the articles were Immunity booster, perfect medical system that comprises psychological, physical, ethical, spiritual health, and philosophical, Antibacterial, and Diseases and Functional foods etc. Eligibility of papers was assessed and papers with inappropriate citation, insufficient data and duplicity were excluded. Finally the selected ones were documented and presented in compiled form.

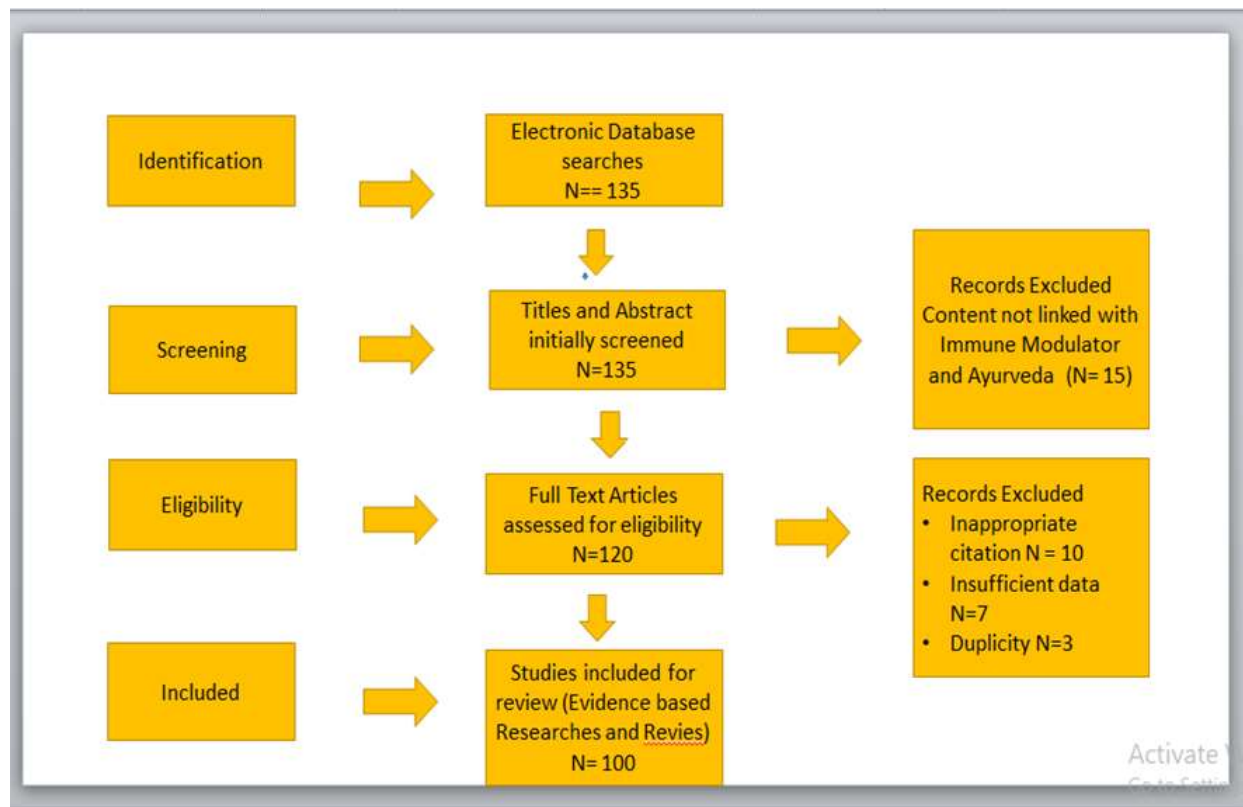


Fig 1: PRISMA for selection of Research based on the topic of Review.

Results and Discussion

Ayurvedic herbs have many properties which help prevent the different types of diseases and also increase the immunity power; it provides help for fighting bacteria and viruses. Antiviral herbs/immunity booster spices inhibit the development of viruses. The most useful antiviral spices stimulate the immune system, which does not allow the body to attack viral pathogens. It can be more useful than attacking many types of pathogens, which antiviral medications/ Immunity booster herbs are organized to do because specific pathogens mutate over time and become slightly sensitive to treatment. Not only do immunity

booster/ antiviral herbs resist viral infections, stimulate the immune system, and operate as flu natural therapies, but they have several other health advantages, like digestive, anti-inflammatory, and cardiovascular support. Ayurveda therapy begins with an inner purification method, observed by a nourishing diet, herbal medicines, yoga, massage treatment, and also meditation³.

Role of Ayurveda Medicinal Plants as Immune Modulator:-

Many different types of Ayurvedic medicinal plants are known for their immune modulating effect (Table: 1). Some plants are discussed below in detail:

Table 1: Intervention Plan/ Dose/ Duration for Immune Modulatory effect of some Ayurvedic medicinal plants in Management of Health and Disease.

S.No.	Intervention Plan/ Dose/ Duration	Number of Participants	Outcomes
1.	An active-controlled, randomized, parallel-group, pilot clinical investigation was carried out. While Group-B patients received SoC (Standard of Care) by solutions based on latest medicinal approach and recommended antiviral drug for management of COVID 19 Group-A subjects received CIM-MEG19 (standardized <i>A. paniculata</i> extract formulation) as an add-on to SOC treatment (Standard of Care). Eighty COVID-19 patients with mild or moderate severity who were RTPCR (Real-Time Polymerase Chain Reaction) positive and eligible were enrolled.	The purpose of the study was to evaluate the effectiveness and safety of CIM-MEG19 (standardized <i>A. paniculata</i> extract formulation), Ayurvedic treatment for COVID-19, clinical recovery, and outcomes in terms of hospitalisation days, as well as any signs of severity caused by drug-drug interactions between CIM-MEG19 TM and Standard of Care (SOC).	Clinically significant (p<0.0001) effects in symptom reduction were observed in patients in experimental category ie group A compared to SoCie group B throughout an average number of days. After 8–11 days, 47% of the CIM-MEG19 add-on samples and 50% of the SoC samples tested COVID-negative according to the RT-PCR analysis. Similar to this, following 14 days of therapy, biochemical studies revealed that CIM-MEG19 group-A had a significant (p<0.05) impact on C-Reactive Protein (CRP) and Interleukin-6 (IL-6). In addition, it was found that CIM-MEG19 add-on therapy improved D-Dimer, ESR, and LDH. The trial was reported to be quiet safe assisted in reduction of severity of infection and ceased the spread/progression

			of the disease. <i>A. paniculata</i> extract formulation known as “CIM-Meg19” may be utilized like a natural remedy to treat COVID-19 ¹⁹ .
2.	The purpose of the study was to determine how honey affected the number of patients who experienced post-operative discomfort after tonsillectomies. The purpose of the study was to determine how honey affected the number of individuals who experienced post-operative discomfort after having a tonsillectomy.	<p>Twenty four adult male tonsillectomy patients were divided into one of three groups at random:</p> <ol style="list-style-type: none"> 1. Placebo group 2. Honey group 3. Control group. <p>Analgesics and antibiotics were administered to all subjects as per protocol. Standard postoperative regimens for the control group, honey group was given honey the placebo group was given a placebo.</p> <p>Gargling with honey from the silk cotton or kapok trees (<i>Ceiba pentandra</i>) was repeated after every 6 hours daily for 10 days.</p> <p>Same procedure was followed in placebo category. The Visual Analogue Scale questionnaire was used to assess pain for ten days, and the use of analgesic medications was noted on days 1, 2, 4, 7, and 10.</p>	When compared to the placebo and control groups, the honey group dramatically reduced pain, with significant reductions in the pain scale “on days 1, 2, 4, 7 and 10 ($p = 0.034$; $p = 0.003$; $p < 0.001$; $p = 0.001$; $p = 0.001$) gradually; Significant differences were also observed in analgesic use, especially on day 2, 4 and 7 ($p = 0.028$; $p = 0.001$; $p = 0.003$) ²⁰ .
3.	Non-gonococcal and non-chlamydial cervicitis accounts for more than half of all cases. As a result, the primary treatment protocol's cure rate has dropped to below 50%. When conventional medical treatment is insufficiently effective, adjuvant therapy may be an option that uses complementary therapies. Honey is utilized as a natural antibacterial and wound-healing agent. To increase the cervicitis cure rate, This research focussed on comparison of honey	<p>A double-blind, randomized clinical research was planned involving 102 females suffering with cervicitis and were referred to gynaecological clinic at Mousavi Hospital in Zanjan, Iran They were split into two groups at random.</p> <p>The conventional oral antibiotic therapy and lubricant gel used as a placebo were given to the control group.</p> <p>The oral standard treatment was given to the intervention group together with vaginal <i>Ziziphus</i> honey as adjuvant therapy. For two weeks, the therapy was administered to both groups once each day. Following the</p>	Both groups' clinical cervicitis symptoms considerably improved post treatment ($p < 0.05$), although the vaginal discharge of intervention group improved ($p < 0.05$). Additionally, <i>Ziziphus</i> Honey group outperformed control group in terms of restoring cervical erosion ($p < 0.05$) ²² .

	adjuvant therapy against the antibiotic therapy.	start of the therapies, the patient's symptoms and clinical data were monitored for three weeks.	
4.	<i>A. paniculata</i> ethanolic extract capsules were investigated for their efficacy for ensuring malaria treatment brought on by isolated infections of “ <i>Plasmodium falciparum</i> or <i>P. vivax</i> ” or by combined infection.	In the malaria-endemic Batubara District of Indonesia's Sumatra Utara Province, an open clinical study was carried out. Sixty nine malaria patients were identified from field with <i>Plasmodium vivax</i> , <i>Plasmodium falciparum</i> as well as combined infection incase of uncomplicated individuals of 12 years of age. <i>A. paniculata</i> ethanol extract weighing 250 mg per capsule is combined with excipients to make the capsules weight 460 mg. Standard capsule shells in the colour of clear are employed. Up to 250 grams of <i>A. paniculata</i> viscous extract were weighed, crushed gradually using many fillers, a dryer, and a developer to create a compact mass, and then the material was sieved to create granules.	Percent efficacy of <i>A. paniculata</i> ethanolic extract capsules 250 mg thrice a day for five days against malaria, and mixed malaria patients was reported to be ninety four percent. No side effects have been reported during the intervention period. <i>A. paniculata</i> ethanolic extract proved to be quiet efficient and has its application as alternative anti-malarial medicine derived from native Indonesian medicinal plants and also as an adjunct in standard malaria treatment ²² .
5.	Patients with diabetes mellitus between the ages of 30 and 65 were included in a three-month experiment. 60 people made up the intervention group; curcuma longa was included. Placebo group (n=54) (metformin was added with or without sulfonylureas).	400 mg of <i>Curcuma longa</i> Metformin use, either with or without sulfonylureas.	Significant decreases in systolic and pulse blood pressure, aortic pressure both diastolic and systolic, aortic augmentation index etc were tested and reported as well as significant improvement was reported ²³ .
6.	The traditional Indian Ayurvedic medical system's most significant and widely researched plant, <i>Emblica officinalis</i> Gatertn (Amla), is discussed along with its preventive efficacies and safety.	During an 18-week research, adult participants (n = 15) with random distribution in amla or a placebo (500 mg daily) group. Effectiveness was checked for effect on Vascular function, hematology, biomarkers related to oxidative and inflammatory stress,. The main efficacy metric of blood fluidity significantly	After consuming amla, there were no appreciable differences in liver hepatotoxicity, urinalysis, or hematology in comparison to either baseline or placebo. After consuming amla, no negative side effects, changes in safety parameters, or problems with tolerance were noticed. Amla supplementation

		<p>improved after amla consumption. Significant improvement in HDL was reported with reduction in LDL Cholesterol. Improvements were also seen in the secondary endpoints, which included a decrease in Vwfie von Willebrand factor as well as reduced 8-hydroxy-2'-deoxyguanosine (8-OHdG), and thrombin (TM), biomarkers of oxidative stress.</p>	<p>increased endothelial functioning, decreased oxidative stress, and had a tolerable taste²⁴.</p>
7.	<p><i>Guduchi</i> and <i>yashtimadhu</i> were evaluated for their clinical efficacy in reducing the side effects of chemotherapy.</p>	<p>A clinical study with a prospective design that tested the hypothesis that <i>guduchi</i> and <i>yashtimadhu</i> supplementation would reduce the negative effects that cancer patients experienced after chemotherapy.</p>	<p>The trial drugs were given to randomly chosen thirty eight cancer patients already under treatment of chemotherapy. Four groups were created : Goups A, Group B, Group C, Group D. Group B received 1 g of <i>guduchighan</i> tablet, group C received 1 g of <i>yashtimadhu ghanwati</i> tablet, and group D received both 1 g of <i>guduchi</i> and <i>yashtimadhughan</i> tablet three times per day with water for ninety days. The group A control group received no medication. For three months, a follow-up was conducted every 15 days. Clinical evaluation of the study was based on the effects of <i>guduchi</i>, <i>yashtimadhu</i> on subjective parameters, such as chemotherapy side effects, and objective parameters, such as haemoglobin percentage, TLC, Counts of Platelets, B. urea as well as S. creatinine level. Pairwise t-tests were employed, and ANOVA tests with corresponding p-values were utilized to compare all groups. The total result demonstrates that, except alopecia (<i>khalitya</i>), every other adverse chemotherapeutic symptom had a p-value of either therapy in group D with statically significant results²⁵.</p>

<p>8.</p>	<p>Dyslipidemia is among the most commonly mentioned risk factors for the emergence of heart complication like atherosclerosis. The current study assessed the effectiveness of amla (<i>Emblica officinalis</i>) extract in patients with dyslipidemia. This extract is made up of polyphenols, triterpenoids, oils, and other substances that are present in fresh wild amla fruit.</p>	<p>Total 98 dyslipidemic individuals in total were enrolled and two groups—amlam and placebo—were created. To the appropriate patient group, a placebo capsule containing 500 mg of amla extract was given twice daily for 12 weeks. The effectiveness of the study drug was evaluated by analysing the lipid profile while the patients were monitored for 12 weeks. Apolipoprotein B (Apo B), apolipoprotein A1 (Apo A1), CoQ10, high-sensitive C-reactive protein (hsCRP), fasting blood sugar (FBS), homocysteine, and thyroid stimulating hormone (TSH) were tested.</p>	<p>In comparison to the placebo group, the main lipids, total cholesterol (TC) ($p = 0.0003$), triglycerides (TG) ($p = 0.0003$), low density lipoprotein cholesterol (LDL-C) ($p = 0.0064$), and very low density lipoprotein cholesterol (VLDL-C) ($p = 0.0001$) reduced significantly in the amla group after 12 weeks. Additionally, the amla group showed a 39% decrease in plasma atherogenic index (AIP) ($p = 0.0177$). When compared to the placebo group, the amla group showed a greater reduction in the ratio of Apo B to Apo A1 ($p = 0.0866$). Neither the amla nor placebo groups' CoQ10 levels changed significantly ($p = 0.2742$ and 0.6744, respectively). Although there was a general tendency towards lower FBS, there were only 8 patients in the amla group who could be categorised as belonging to the pre-diabetes and diabetes groups (FBS > 100 mg/dl). Hence amla extract utilised in the have hypoglycaemic properties. It is possible to treat both general and diabetic dyslipidemia with the amla extract because it has demonstrated substantial potential in lowering TC and TG levels, lipid ratios, AIP, and apoB/apo A-I in dyslipidemic individuals. It is uncommon to find a single medication that can lower TG and cholesterol. In contrast, cholesterol reduction is achieved without a concurrent decrease in Co Q10²⁶.</p>
<p>9.</p>	<p>The current study's goal was to assess how supplementing with cardamom (<i>Elettaria cardamomum</i>) affected pre-</p>	<p>On 80 pre-diabetic participants, a randomised, placebo-controlled, double-blind clinical investigation was conducted. For eight weeks, they were</p>	<p>A significant reduction was observed in Cardamom supplementation group since serum hs-CRP ($p = 0.02$), hs-CRP IL-6(-1) ratio ($p = 0.008$),</p>

	diabetic women who were hyperlipidemic, overweight, and obese, as well as their levels of inflammation and oxidative stress.	given: cardamom supplement (n = 40, 3 gd(-1)) an identical inert placebo (n = 40). At baseline and following the intervention, the serum levels of C-reactive protein (hs-CRP), interleukin-6 (IL-6), tumour necrosis factor-alpha (TNF-), total antioxidant capacity (TAC), malondialdehyde (MDA), protein carbonyl (PC), and erythrocyte superoxide dismutase (SOD) and glutathione reductase (GR) activity" were examined.	and MDA (p = 0.009) compared to the placebo group ²⁷ .
10.	Randomized controlled clinical trial with 40 male adults (T2 DM) (45 – 55 years) 30 adults	In the study, the patients who went to the "MANAN" clinic were taken into account. For the study, a total of 40 patients (aged 45 to 55) were chosen. An RCT was carried out at the "MANAN" clinic in Vadodara. Twenty men and twenty women with Type 2 diabetes were enrolled in the trial. Good grade Tulsi leaves were acquired from the neighbourhood market for the powder preparation and further encapsulation. Each capsule included 3g of this sap green colouring powder. Estimation of the biochemical profile, including FBS, PP2 bS, and HbA1 C, was done to evaluate effectiveness and then statically tested.	Tulsi have been suggested for their anti-diabetic, anti-hypertensive, adaptogenic, antilipidemic, cardio protecting, and other characteristics in the traditional Indian medical system. In this study, after examining the data, we found that taking <i>Ocimum sanctum</i> L. powder capsules for a longer period of time (3 months) significantly reduced all reports. The prior data indicates that Tulsi supplements are more advantageous for men than for women since; women's physical activity was lower than that of men. 3g each day before meals and Significant drop in postprandial and fasting blood sugar levels ²⁸ .
11.	The purpose of the study is to find out if <i>Azadirachta indica</i> , an extract from Neem leaves, has any antibacterial effects on both methicillin-sensitive and methicillin-resistant <i>Staphylococcus aureus</i> . The anti-Staphylococcal effects of Neem leaf extract were compared to those of oxacillin, vancomycin,	A properly recognised and validated Neem leaf was used in an in vitro experimental study, and the active components were extracted using ethanol before being diluted to generate 25%, 50%, 75%, and 100% concentrations. Standardised disc susceptibility testing was performed on clinical isolates of MRSA and normal strains of	With increasing extract concentration, an increase in antibacterial activity was seen as a trend. For MRSA and <i>S. aureus</i> , zones of inhibition began to form at 50% and 75%, respectively, of the concentration. The zones of inhibition produced by the antibiotics were higher than those by the Neem extracts. Hence Neem leaves have

	<p>mupirozin, and povidone iodine.</p>	<p><i>Staphylococcus aureus</i> after they were inoculated on blood agar plates. Each test extract's zones of inhibition were quantified and contrasted with those of four commonly prescribed drugs—oxacillin, vancomycin, mupirocin, and povidone iodine—as well as the pure diluent, which served as a negative control. The student's t-test was used to assess significance as part of the difference of means hypothesis testing that was used to analyse the data.</p>	<p>antibacterial action against <i>Staphylococcus aureus</i> and MRSA, with the largest zones of inhibition observed at 100% concentration²⁹.</p>
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Echinacea purpurea:

Echinacea is a considerably effective natural antiviral against human viruses. It has become the top-selling herb of any time that's because the daily benefit of *Echinacea* is important for overall health and immune support. *Echinacea* has many phytochemicals; it can decrease tumours and virus infections. *Echinacea* inhibits viruses and bacteria from penetrating healthy cells. *Echinacea* has many benefits included such as reducing inflammation, improving skin problems, improving mental health, treating upper respiratory issues, and ability alleviating pain⁴.

Andrographis paniculata:

Andrographis is the most famous medicinal plant which is used as an antiviral (malaria and influenza) antioxidant, antimicrobial, and anti-inflammatory in Africa, America, and Asia. Today, researchers have explored *Andrographis* as a potent antiviral remedy. *Andrographis* has been deemed a miraculous compound for restraining virus replication and virus development. It is found in two forms such as tincture and capsule forms⁵.

Allium sativum:

Allium sativum commonly known as Garlic has specific chemical compounds, it's very useful at destroying microorganisms reliable for some of the rarest infections and also

common infections, including thrush, pneumonia, tuberculosis, and also herpes. It has a good property; it helps in eyes infections. Raw garlic can reduce the risk of hypertension and cancer, increase immunity power, encourage cardiovascular health, and stop hair loss. It's had many types of amino acids such as arginine, aspartic acid, valine, lysine, Minerals like manganese, potassium, phosphorus, calcium, selenium, magnesium. Vitamins include vitamin B6, Vitamin C and also folic acid, niacin, and pantothenic acid⁶.

Olea europaea:

Olive leaf has antiviral properties, it helps the good treatment of dangerous viruses or colds adding candida symptoms, chronic fatigue syndrome, hepatitis B, pneumonia. Several types of research say that olive leaf is very effective for the fight against diseases causing microbes, also including viruses that cause respiratory infections and influenza. The most powerful compound is present in olive leaf and it destroys the organisms and reduces viruses to replicate or infections. This olive leaf is very beneficial for our health and provides a good amount of immunity power⁷.

Withania somnifera:

Ashwagandha is a very important herb for our health which helps too boost the immunity power and prevent diseases. It has more types of properties such as anti-viral,

anti-oxidant, and so on. This herb increases the number of pathogens fighting agents such as White blood cells and platelets. Ashwagandha also fights chronic/severe stress which debilitates the immune system. It is also important to include decreased anxiety and stress, reduction in inflammation improved mood, blood sugar level, and also memory. It has more different types of nutrients such as amino acids, alkaloids, volatile oil, steroids, reducing sugars, starch, crude fibre, glycosides, tannins, minerals such as K, Mn, Na, Fe, Zn, Cu, Al, Ca, total sugars, reducing sugars and non-reducing sugars⁸.

Asparagus racemosus:

Asparagus racemosus or Shatavari is the most powerful herb which enhances immunity power. It has anti-oxidant and immune-stimulant properties. This herb enhances and strength immune system of the body. It also prevents diseases. Asparagus is mainly rich in saponins and this plant contains vitamins A, B1, B2, Magnesium, Vitamin C, Potassium, Calcium, Iron, Vitamin E, and Folic acid too. Further primary chemical components of *Asparagus racemosus* are arginine, asparagine, and tyrosine, flavonoids such as kaempferol, resin, and tannin⁹.

Tinospora cordifolia:

Tinospora cordifolia or Giloy is a very effective herb for our health and also fights against diseases and viruses. Giloy balances all three types of Pitta, doshas–Vata, and Kapha. Giloy powder mixed with a teaspoon of honey once or twice a day after meals helps to boost immunity. Chronic lung diseases such as chronic asthma, tuberculosis, chronic bronchitis, and so on are also caused due to depleted immunity. It is used in form of a home remedy. Giloy includes terpenoids i.e. Furanolactonediterpene, Tinosporide, furanoidditerpeneas poly acetate, phenylpropene disaccharides cordifolioside

A, B, C, as well as D and E, choline, and other glucosides¹⁰.

Apis mellifera:

In Ayurveda, honey is used for its numerous health benefits. Honey balances Pitta and Kapha. It helps in increasing immunity power. Honey is maintaining the digestion system and provides the strength to fight viruses and bacteria. It helps for good digestion and also prevention of diseases. Honey contains Caffeic acid, Phenyl lactic acid, p-Comair acid, 4-Methoxyphenolactic acid, Gallic acid, 5-Hydroxymethylfurfural, 2-Methoxybenzoic acid, 5-Hydroxymethylfurfural¹¹.

Emblca officinalis:

Emblca officinalis or Amla is a very rich source of Vitamin C and also have natural antioxidant property. This property is helping the body to fight against infections by increasing/ boosting immunity power so it is very effective for virus infections. Regular amla is included in the diet because it is very effective against infections. Amla is used in different forms such as pickles, salads and veg juices, and so on. Amla has many benefits such as it helps to balance stomach acids, increase food absorption, immunity power, and fertility, nourishes the brain and improves mental behaviour and functioning, effective for skin and promoting healthier hair, also regulating elimination of toxins, etc. Amla contains gallic acid, flavonoids, tannins, pectin, polyphenolic compounds, and vitamin C. Phytochemical components include alkaloids, terpenoids, flavonoids, ellagic acid etc. Many types of Fatty acids are present in it too i.e. linoleic acid 44.0%, linolenic acid 8.8%, oleic acid 28.4%, palmitic acid 3.0%, stearic 2.15% and myristic 1.0%¹².

Curcuma longa:

In Ayurveda, turmeric is one of the widely used herbs because its numerous health important and also helps boost immunity

power. Turmeric can be taken along with milk will nullify its hot potency. Turmeric helps in boosting immunity power and metabolism besides protecting against bacterial and viral infections. It contains chemical compounds like 1-hydroxy-1,7-bis (4-hydroxy-3-methoxyphenyl) -(6E)-6-heptene-3,5-dione; 1, 5- bis (4-hydroxy-3-methoxyphenyl)-Penta-(1E,4E)-1,4-dien-3-one¹³.

Ocimum tenuiflorum:

Tulsi leaves are very common at home and traditionally known for their fragrance and immune boosting properties. It is well known for its anti-inflammatory, anti-anxiety, and anti-depression properties. It supports against heart disorder, arthritis, hypercholesterolemia, reduces blood sugar, decreases joint pains. It improves immunity and fights against flu/viral infections, cough. Leaves and stem of *Ocimum sanctum* extract contain phenolic compounds like circimaritin, circilineol, apigenin, isothymusin, and rotameric acid with antioxidants properties. The tulsi leaves contain 0.7% volatile oil and 20% methyl eugenol besides being rich in sesquiterpene hydrocarbon caryophyllene and carvacrol which further enhance its therapeutic efficacy¹⁴.

Azadirachta indica:

Azadirachta indica leaves or Neem leaves widely help to reduce fever sensation by bringing down body temperature and ensuring cooling internally. It has more effective properties such as anti-fungal, anti-bacterial, and anti-viral properties which improve the immunity power and helps in prevention of diseases. It is a suitable source for maintaining skin health and clears impurities from the blood. Neem leaves contain i.e. Amino acid, ascorbic acid, 7-desacetyl-7-benzoylgedunin, 6-desacetylnimbinene, nimbanene, nimbolide, nimbandiol, nimbiol, 7-desacetyl-7-benzoylazadiradione¹⁵.

Bacopa monnieri:

Brahmi leaves are very important and effective because it has antioxidant properties which help protect them from cancerous cells. Brahmi leaf is utilized to treat Alzheimer's disorder, stress, and anxiety, improves memory and fights infections. It contains chemical components that include alkaloids and sterols such as bacopasides, herpestine, brahmine, monnierin, beta-sitosterol, luteolin, quercetin, bacosine, apigenin, and nicotine. It has therapeutic properties of Brahmi oil is cardio-tonic, antipyretic, anti-inflammatory, analgesic, antimicrobial, antioxidant, sedative, stomachic, astringent and also antiepileptic in nature¹⁶.

Elettaria cardamomum:

Cardamom is a queen of spices because it has a very good aroma and taste. It has anti-inflammatory properties which help keep away from chronic disorder by boosting the immunity power. Another benefit of cardamom is decreasing digestion problems and reducing stress. It is very important for the prevention of diseases and viral infections. Chemical components of cardamom oil are methyl eugenol, sabinene, a-phellandrene, γ -terpinene, limonene, myrcene, linalyl acetate, geraniol, b-pinene, a-pinene, terpinolene, terpinene-4-ol, linalool, citronellol, 1, 8-cineole¹⁷.

Cinnamomum verum:

Cinnamon is a commonly known immune system booster and it enhances immunity power. It has anti-inflammatory properties that support the fight against the most harmful fungus and viruses' infections. It also reduces the chance of cancer and heart disorder¹⁸.

Conclusion and Future Prospects

Ayurvedic medicinal plants have promising profile in acting as immune modulator and besides scoring over the side effects caused by the allopathic medicines they even prove to be cost effective. Considering the future

prospects it is imperative to reinforce a targeted approach supported by latest innovation in the recommended field. More evidence based research is suggested on identified variety of medicinal plants in order to overcome therapeutic dilemma and ensure better utilization of this traditional Indian resource for ensuring better health and overcome disease.

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