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Review Article

Medicinal Herbal Plants and Their Pharmacological Activities: A Comprehensive Review of Therapeutic Potential and Health Benefits.

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ABSTRACT

Medicinal plants have been crucial in traditional healthcare practices and still garner scientific interest due to their varied phytochemical components and possible therapeutic uses. This review encapsulates the pharmacological effects and health advantages associated with selected medicinal plants, such as *Ocimum sanctum*, *Azadirachta indica*, *Curcuma longa*, *Zingiber officinale*, *Withania somnifera*, *Centella asiatica*, *Aloe vera*, *Camellia sinensis*, and other significant herbal species. Different parts of these plants are rich in bioactive compounds, which include alkaloids, flavonoids, phenolic compounds, terpenoids, tannins, and glycosides, potentially contributing to their biological properties. The pharmacological characteristics outlined encompass antimicrobial, antioxidant, anti-inflammatory, antidiabetic, anticancer, antihypertensive, cardioprotective, hepatoprotective, analgesic, antimalarial, and immunomodulatory effects. The review also emphasizes the necessity of phytochemical exploration, pharmacological assessment, and standardized quality-control methods in assessing medicinal plants. Although experimental studies and selected clinical investigations indicate promising therapeutic potential, the strength of evidence varies considerably among plant species, extracts and health conditions. Safety concerns, including adverse reactions, contamination, variations in chemical composition and herb–drug interactions, must also be considered.

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Further investigations involving active-compound identification, toxicological assessment, standardized formulations and well-designed clinical trials are essential to establish the efficacy, safety and appropriate therapeutic applications of medicinal herbal plants.

INTRODUCTION

Medicinal Herbal Plants and Their Pharmacological Activities

Medicinal plants have played an important role in traditional healthcare systems for centuries and continue to contribute to modern pharmaceutical research. Different plant parts, including roots, stems, leaves, flowers, fruits, seeds and bark, contain biologically active constituents such as alkaloids, flavonoids, phenolic compounds, terpenoids, tannins, saponins and glycosides. These phytochemicals are investigated for their potential antioxidant, antimicrobial, anti-inflammatory, antidiabetic, hepatoprotective, cardioprotective and other pharmacological activities. However, no single herbal plant provides every health benefit, and the biological effects depend on the plant species, chemical composition, preparation, dosage and individual health conditions. The following medicinal plants are examples of widely studied species with different pharmacological properties. The reported activities are not all clinically established, and herbal products should not be considered substitutes for proven medical treatment.

Important medicinal herbal plants and their pharmacological activities

1. Tulsi (*Ocimum tenuiflorum* L., syn. *Ocimum sanctum* L.): Tulsi, commonly known as holy basil, is an aromatic medicinal herb widely used in Ayurveda. Its leaves contain eugenol, rosmarinic acid, flavonoids and other bioactive constituents. Scientific investigations have reported potential antioxidant, antimicrobial, anti-inflammatory, adaptogenic, cardioprotective and immunomodulatory activities. A systematic review of human studies identified preliminary evidence of possible benefits relating to metabolic health, cardiovascular health, immunity and psychological stress, although larger and better-designed clinical trials are required ^[1]. Tulsi is therefore an important candidate

for further research into plant-derived compounds and their potential applications in preventive healthcare.

2. Neem (*Azadirachta indica* A. Juss.): Neem is a widely distributed medicinal tree whose leaves, bark, seeds and oil have been used in traditional medicine. Its chemical constituents include limonoids, azadirachtin, nimbin and other biologically active compounds. Pharmacological investigations have examined its antimicrobial, antifungal, anti-inflammatory, antioxidant and insecticidal properties. Neem extracts are also investigated for their potential applications in skin-care products, oral hygiene and topical formulations. However, the effects differ among plant parts and preparations, and laboratory findings should not be interpreted as proof that neem treats infections or inflammatory diseases in humans ^[2,3].

3. Turmeric (*Curcuma longa* L.): Turmeric is a rhizomatous plant commonly used as a culinary spice and traditional herbal ingredient. Curcumin and related curcuminoids are among its most extensively investigated constituents. Research has explored their antioxidant and anti-inflammatory activities, including effects on molecular pathways associated with inflammatory mediators and oxidative stress. Turmeric has consequently attracted interest in research on inflammatory conditions, metabolic health and other chronic disorders ^[3]. Nevertheless, curcumin has limited oral bioavailability, and the effectiveness of a preparation depends on its formulation, dose and absorption. Evidence obtained from laboratory experiments or concentrated extracts cannot automatically be applied to ordinary dietary turmeric or all commercial supplements.

4. Ginger (*Zingiber officinale* Roscoe): Ginger is an aromatic rhizome used in food and traditional medicine. Its major bioactive compounds include gingerols, shogaols and related phenolic constituents. Pharmacological research has investigated ginger for antioxidant, anti-inflammatory, digestive and antiemetic effects. Certain ginger preparations have been studied clinically for nausea, including pregnancy-associated nausea, although results depend on the specific preparation and clinical circumstances. Ginger is also being investigated for potential effects on pain and metabolic markers ^[3]. It may cause



gastrointestinal discomfort in some individuals and may interact with certain medicines; therefore, concentrated supplements require appropriate consideration, particularly for people taking regular medication.

5. Aloe vera (*Aloe vera* (L.) Burm.f.): Aloe vera is a succulent plant widely used in cosmetic products and topical preparations. Its inner leaf gel contains polysaccharides, including acemannan, while the outer leaf contains latex compounds such as aloin. Research has examined the moisturizing, wound-related, anti-inflammatory and antimicrobial properties of aloe preparations. Topical products are commonly investigated for skin hydration and selected skin conditions, but evidence for wound healing and other clinical uses varies according to the indication and formulation. Aloe latex and inadequately processed whole-leaf products may contain compounds with laxative effects and can cause adverse reactions. Consequently, inner-leaf gel and latex-containing preparations should not be considered interchangeable ^[4].

6. Ashwagandha (*Withania somnifera* (L.) Dunal): Ashwagandha is an important medicinal shrub in Ayurveda. Its roots and leaves contain withanolides and other constituents that have been studied for their biological effects. Investigations have focused on stress-related outcomes, sleep, anxiety symptoms, inflammation and selected metabolic parameters. Some clinical studies suggest potential benefits for stress and sleep, but the certainty of evidence is limited by differences in extract composition, dosage, study duration and trial quality. Ashwagandha is not appropriate for everyone; it has been associated with rare liver injury and may affect thyroid function or interact with medicines. Its use requires particular caution during pregnancy and in people with liver or thyroid disorders ^[5].

7. Amla (*Phyllanthus emblica* L.): Amla, also called Indian gooseberry, is a fruit-bearing medicinal tree used in traditional Indian healthcare. Its fruits contain vitamin C, polyphenols, tannins and other phytochemicals, although the concentration of individual constituents varies with processing and storage. Pharmacological studies have investigated its antioxidant, anti-inflammatory, lipid-modulating and potential glucose-regulating properties. Amla extracts have

attracted research interest in metabolic and cardiovascular health because oxidative stress and abnormal lipid metabolism are associated with several chronic diseases. However, the strength of clinical evidence differs among preparations and outcomes, and amla should not replace established treatment for diabetes or cardiovascular disorders ^[2,3].

8. Garlic (*Allium sativum* L.): Garlic is a bulbous plant used both as a food ingredient and in traditional medicine. It contains sulfur-containing compounds, including alliin and allicin, which are formed or transformed during crushing, processing and storage. Research has investigated garlic for antimicrobial, antioxidant and cardiovascular effects, including possible modest reductions in blood pressure or blood lipid levels in some populations. These effects vary with the formulation and the quantity consumed. Garlic supplements may increase bleeding risk, particularly when combined with anticoagulant or antiplatelet medicines, and should be discussed with a healthcare professional before surgery or when used with prescribed medication ^[3].

9. Green tea (*Camellia sinensis* (L.) Kuntze): Green tea is prepared from the leaves of *Camellia sinensis* and contains catechins, particularly epigallocatechin gallate, along with caffeine and other constituents. It has been widely investigated for antioxidant, anti-inflammatory and potential metabolic effects. Studies have examined its possible influence on lipid levels, body weight and markers of cardiovascular health, but the magnitude of benefit varies and is often modest. Ordinary green tea consumed as a beverage differs substantially from concentrated green tea extracts. High-dose extracts have been associated with liver injury in some cases, so concentrated products require caution ^[3].

10. *Tragia involucrata* L.: *Tragia involucrata*, a member of the Euphorbiaceae family, is a medicinal herb used in traditional Indian and Sri Lankan healthcare. Its roots and leaves have been investigated for phytochemical constituents, including flavonoids, phenolic compounds, terpenoids, tannins and other secondary metabolites. Published experimental studies have examined its antioxidant, antibacterial, anti-inflammatory and other pharmacological properties. The



findings suggest that different solvent extracts may contain constituents with potentially useful biological activities. However, much of the evidence remains preliminary, and the results from leaf extracts cannot automatically be attributed to root extracts. Additional chemical characterization, toxicity testing and controlled pharmacological studies are necessary before specific therapeutic applications can be established.

Pharmacological activity: -

1. Antibiotic property: -

The anti-microbial are a sort of antimicrobial substance that are compelling dynamic against microbes. This can be the foremost vital antibacterial specialist for battling bacterial infections contagious contamination pr, and anti-microbial medicines are broadly utilized within the treatment and avoidance of such diseases. They may either murder or repress the development of microbes [6].

Operators that hinder the union of bacterial cell divider: -These incorporate the penicillins and cephalosporins that are fundamentally comparable and disparate specialists, such as cycloserine, vancomycin, bacitracin and the imidazole antifungal specialists. Operators that act straightforwardly on the cell film of the micro-organisms, influencing porousness, and driving to spillage of intracellular compounds: These incorporate polymyxin, polyene antifungal specialists, nystatin, and amphotericin B that tie to cell divider sterols [7].

Operators that influence the work of 30s and 50s ribosomal subunits to cause reversible restraint of protein blend: - These incorporate tetracyclines, erythromycins, chloramphenicol, and clindamycin. Specialists that tie to the 30s ribosomal subunit and change protein amalgamation These incorporate aminoglycosides that leads to cell passings in the long run. Those anti-biotic Operators that influence nucleic corrosive digestion system which restrain DNA subordinate RNA polymerase. There are numerous plants which are having anti-microbial property such as Tulsi, Neem, Basak, Nayantara, Ginger, etc [7].

2. Antiviral Activity: -

Against viral property implies those drugs which repress the development of the infection. The component

of activity of the antiviral action of OBP is proposed to incorporate impedances with viral amino corrosive generation, anticipation of infection shedding, hindrance of viral replication, neutralization of turn around transcriptase and protease in retroviruses, anticipation of infection section to cells, disturbance of infection [8].

3. Antioxidant activity: -

Cancer prevention agents are normally happening plant substances that secure the body from harm caused by hurtful atoms called free radicals. Cancer prevention agents offer assistance anticipate oxidation, which can cause harm to cells and may contribute to maturing. They may progress im mane work and maybe lower the hazard for contamination, cardiovascular malady, and cancer. Cancer prevention agents exist as vitamins, minerals and other compounds in nourishments. A slim down containing bounty of natural products and vegetables, entirety grains and nuts can supply all the cancer prevention agents your body needs. Diets wealthy in cancer prevention agents can be exceptionally useful A couple of of the way better known cancer prevention agents incorporate carotenoids (a shape of vitamin A)-the substance that gives natural products and vegetables their profound wealthy colors. Apricots, broccoli, pumpkin, cantaloupes, spinach and sweet potatoes are great choices. Nourishments containing vitamins C and E are moreover great sources of cancer prevention agents, as well as selenium and zinc [8].

4. Anti-inflammatory activity: -

The non-steroidal anti-inflammatory drugs (NSAIDs) are broadly utilized for the treatment of minor torment and for the administration of edema and tissue harm coming about from provocative joint illness (joint pain). A number of these drugs have antipyretic movement in expansion to having pain relieving and anti-inflammatory activities, and in this way have utility within the treatment of fever. The major instrument by which the NSAIDs evoke their restorative impacts (antipyretic, pain relieving, and anti-inflammatory exercises) is hindrance of prostaglandin (PG) union. Specifically, NSAIDs competitively (for the foremost portion) restrain cyclooxygenases (COXs), the proteins that catalyze the synthesis of cyclic endoperoxides from arachidonic corrosive to create prostaglandins.



Two COX isoenzymes have been recognized: COX-1 and COX-2. COX-1, communicated constitutively, is synthesized ceaselessly and is displayed in all tissues and cell sorts, most strikingly in platelets, endothelial cells, the GI energized tract, renal microvasculature, glomerulus, and collecting conduits. In this way COX-1 is critical for the generation of prostaglandins of homeostatic upkeep, such as platelet accumulation, the control of blood stream within the kidney and stomach, and the direction of gastric corrosive emission. Hindrance of COX-1 action is considered a major donor to NSAID GI harmfulness. COX-2 is considered an inducible isoenzyme, in spite of the fact that there's some constitutive expression within the kidney, brain, bone, female regenerative framework, neoplasias, and GI tract. The COX-2 isoenzyme plays an critical part in torment and fiery forms. For the most part, the NSAIDs repress both COX-1 and COX-2. Most NSAIDs are primarily COX-1 particular (eg, ibuprofen, ketoprofen, indomethacin, piroxicam, sulindac). Others are considered somewhat specific for COX-1 and others may be considered marginally particular for COX-2. The component of activity of celecoxib and rofecoxib is basically specific hindrance of COX-2; at helpful concentrations, the COX-1 isoenzyme is not hindered in this way GI harmfulness may be diminished [9].

5. Anti-Protozoal Property: -

Protozoan contaminations are parasitic infections caused by life forms once in the past classified within the Kingdom Protozoa. They are more often than not contracted by either a creepy crawly vector or by contact with a contaminated substance or surface and incorporate life forms called Amoebozoa. Protozoan contaminations are mindful for infections that influence numerous distinctive sorts of organisms. Numerous of the foremost predominant and dangerous human infections are caused by a protozoan disease, counting African Resting Ailment, amoebic diarrhea, and intestinal sickness. The species initially named "protozoa" are not closely related to each other and as it were have shallow likenesses. In a few regions with mild climates in which sanitation is destitute, the predominance of amebiasis has been assessed to be as tall as 20% of the populace. The causative living being, *Entamoeba histolytica*, can attack the divider of the

colon or other parts of the body. Antiprotozoal specialists are a lesson of pharmaceuticals utilized in treatment of protozoan contamination. Common protozoas are a sort of kinetoplastids. Trypanosoma which is African trypanosomiasis, moreover known as African resting ailment or basically resting ailment, is a creepy crawly-borne parasitic malady [10].

6. Anti-Hypertensive activity: -

Hypertension (HT) could be an exceptionally common disorder, especially past center age. It isn't a malady in itself, but is an critical hazard figure for cardiovascular mortality and horribleness. The cutoff manometric perusing between normotensives and hypertensives is self-assertive. For viable purposes 'hypertension' can be that level of BP at or above which long-term anti-hypertensive treatment will decrease cardiovascular mortality. Antihypertensive sedate treatment has been strikingly made strides within the final 60 a long time. Diverse classes of drugs have gotten unmistakable quality with section of time in this period. Sometime recently 1950 barely any compelling and endured antihypertensive was accessible. Veratrum and Grass, the cyanate might lower BP, but were harmful and troublesome to utilize. The ganglion blockers created within the 1950s were successful, but created a assortment of side impacts. Reserpine was a breakthrough, but delivered mental sadness. The helpful potential of hydralazine might not be tapped completely since of checked side impacts when it was utilized alone. Guanethidine presented in 1961 was an enhancement on ganglion blockers. The antihypertensives of the 1960-70s were methyl dopa, Beta blockers, thiazide and tall ceiling diuretics and clonidine. The status of Beta blockers and diuretics was solidified within the 1970s and specific α_1 blocker prazosin broke unused grounds. The antihypertensives presented within the 1980-90s were angiotensin II changing over chemical (Expert) inhibitors and calcium channel blockers. Angiotensin receptor blockers (losartan, etc.) were included before long after, and the coordinate renin inhibitor aliskiren is the most recent medicate. With the development of numerous sorts of drugs, outline of their long-term benefits and complications, and understanding of the standards on which to combine them, hypertension can



now be controlled in most cases with least inconvenience ^[11].

7. Hyperlipidaemic Activity :-

Hyperlipidaemic drugs are those which lower the levels of lipids and lipoproteins in blood. The hyperlipidaemic drugs have pulled in significant consideration since of their potential to avoid cardiovascular illness by hindering the quickened atherosclerosis in hyperlipidaemic people. Lipids are carried in plasma in lipoproteins after getting related with a few apoproteins; plasma lipid concentrations are subordinate on the concentration of lipoproteins. The hydrophobic center of lipoprotein globules comprises of triglycerides (TGs) or cholesteryl esters (CHES) whereas the external polar layer has phospholipids, free cholesterol (CH) and apoproteins. The lipoproteins have been isolated into 6 classes on the premise of their molecule estimate and thickness. They too vary within the nature of apoproteins, the proportion of TG and CHE, tissue of root and destiny. Dietary lipids are ingested within the digestive system with the assistance of bile acids. Chylomicrons (Chy) are shaped and passed into lacteals-reach blood stream by means of thoracic conduit. Amid their section through capillaries, the endothelium bound lipoprotein lipase hydrolyses the TGs into greasy acids which pass into muscle cells to be utilized as vitality source and in fat cells to be reconverted into TGs and put away. The remaining part-chylomicron leftover (Chy, rem.) containing primarily CHE and small TG is inundated by liver cells, which have receptors for the surface apoproteins of Chy. rem., and processed. Free CH that's freed is either put away in liver cells after esterification or consolidated into a diverse lipoprotein and discharged in blood or excreted in bile as CH or bile acids. Liver secretes exceptionally moo thickness lipoproteins (VLDL) containing primarily TG and a few CHE into blood, VLDL is acted upon by endothelial lipoprotein lipase within the same ^[12].

8. Anti-Ulcer Activity :-

In gastric ulcer, for the most part corrosive emission is ordinary or moo, whereas lacking mucosal protection (for the most part impeded bodily fluid and bicarbonate secretion) plays a more prominent part. In duodenal

ulcer, corrosive discharge is tall in around half of the patients but typical within the rest. Regardless whether generation of corrosive is ordinary or tall, it does contribute to ulceration as an aggressive calculate, reduction of which is the most approach to ulcer treatment. An understanding of the instrument and control of gastric corrosive discharge will illustrate the targets of antisecretory medicate activity. The components working at the gastric parietal cells are . The terminal protein H K ATPase (proton pump) which secretes H particles within the apical canaliculi of parietal cells can be enacted by histamine, ACh and gastrin acting through their claim receptors found on the basolateral film of these cells. Out of the three physiological secretagogues, histamine, acting through H₂ receptors, plays the overwhelming part, since the other two, gastrin and ACh act incompletely specifically and to a more noteworthy degree indirectly by discharging histamine from paracrine enterochromaffin-like (ECL) cells called "histaminocytes" found within the oxyntic organs. Whereas H₂ receptors actuate HK ATPase by producing CAMP, muscarinic and gastrin/ cholecystokinin (CCK2) receptors show up to operate through the phospholipase C--->IP3-DAG pathway that mobilizes intracellular Ca²⁺. The cAMP interceded proton pump enactment too includes Ca. The secretomotor reaction to gastrin and cholinergic agonists is expressed completely as it were in the nearness of cAMP produced by H₂ enactment. As such, histamine takes part within the corrosive reaction to gastrin and ACh at more than one levels, and H₂ adversaries stifle not as it were histamine, but too ACh, pentagastrin and in truth any gastric corrosive secretory jolt Gastrin is emitted from the antrum in reaction to rise in antral pH, nourishment constituents, particularly peptides, and vagally interceded reflexes including ganglion cells of the enteric apprehensive framework (ENS). The postganglionic ENS neurones inspire gastrin discharge from gastrin discharging 'G' cells by explaining ACh as well as gastrin discharging peptide (GRP). The overwhelming muscarinic receptor intervening vagal reactions is of the M3 subtype. Its area on the ganglion cells of the intramural plexuses has been affirmed. The parietal cell and ECL cell muscarinic receptors are of the M3 subtype. Vagus discharges ACh in close proximity to ECL cells and 'G' cells, but clearly at a separate



from the parietal cells. As such, vagal impacts are applied to a great extent by implication through histamine and gastrin. Prostaglandins have been credited a "cytoprotective" part within the gastric mucosa by increasing bodily fluid and bicarbonate emission from gastric mucosal epithelial cells, as well as other activities. Before long after discharge, the gastric bodily fluid changes into an adherent gell-like film over the mucosa which traps the discharged HCO₃ particles and prevents their neutralization by making a boundary for the H particles within the juice. It too shields the mucosa from assault by pepsin. PGE₂, created by gastric mucosa, represses corrosive emission by contradicting cAMP era (in parietal cells) and gastrin discharge (from antral G cells) [12].

9. Sedative--Hypnotics: -

Sedative : - A medicate that stifles fervor and calms the subject without actuating rest, in spite of the fact that laziness may be delivered. Sedation alludes to diminished responsiveness to incitement; is related with a few diminish in readiness, ideation and engine action.

Hypnotic :- A medicate that actuates and/or keeps up rest, comparative to ordinary arousable rest. This can be not to be confounded with 'hypnosis' meaning a trans-like state in which the subject gets to be inactive and exceedingly suggestible.

The tranquilizers and hypnotics are CNS depressants with to some degree varying time-action and dose-action connections. Those with faster onset, shorter length and more extreme dose-response bends are favored as hypnotics whereas more gradually acting drugs with compliment dose-response curves are utilized as narcotics. Be that as it may, there's significant cover; a sleep inducing at lower dosage may act as narcotic. Hence, sedation-hypnosis-general anesthesia may be respected as expanding grades of CNS depression. Hypnotics given in tall dosages can deliver common anesthesia. Be that as it may, benzodiazepines (BZDs) cannot be considered nonselective or worldwide CNS depressants like barbiturates and other more seasoned hypnotics. Treatment of a sleeping disorder is

the foremost imperative utilize of this course of drugs [11].

10. Anti-Malarial activity: -

Malaria caused by 4 species of the proto-zoal parasite Plasmodium, is endemic in most parts of India and other tropical nations. It proceeds to be a major open wellbeing issue. basically due to *P. falciparum* (P.f.) disease and its complications. The bark of Cinchona tree, developing in Peru, was presented in Europe within the early 17th century as a remedy for fevers. Afterward it was realized to be a particular cure for malaria. Quinine, confined from Cinchona bark in 1820, supplanted the crude planning and kept on be the major antimalarial medicate till 1942. The world's supply of Cinchona bark for creating quinine was met by Java and neighboring nations. This was cut off from the Germans amid World War I and from the Partners amid World War II. Due to colossal military significance of intestinal sickness and its treatment, strongly action was started for the advancement of antimalarial drugs. Mepacrine was created in Germany in 1926 and broadly field tried by the Partners amid World War II. Chloroquine was delivered in USA before long after as a less harmful elective to mepacrine. It had as of now been synthesized and utilized by Germans in 1934 as 'Resochin'. Proguanil was presented in 1945 by the British as a well endured clinical healing. None of the over drugs were found to be competent of anticipating backslides in vivax malaria. Pamaquine was the primary 8-aminoquinoline to be tested in Germany within the 1920s. In any case, no consideration was paid to it because of its destitute schizontocidal activity. This course of drugs was retested amid World War II as radical corrective and Primaquine developed as the foremost alluring sedate. Pyrimethamine was produced in 1951 beneath a arranged post-war investigate program for antimalarial drugs. In this way, chloroquine resistance developed in *P. falciparum* and a few drugs were created to overcome it; the imperative ones are Mefloquine, Lumefantrine, Atovaquone, Pyronaridine, etc. In any case, the foremost significant advance is the Chinese herb inferred quick acting Artemisinin compounds, the most recent one of which may be an engineered subordinate Arterolane created in India [12].



Table 1: Pharmacological Property of Some Plants

SI No.	Common name	Scientific name	Pharmacological property	Reference
	Tulsi	<i>Ocimum sanctum</i>	Anti-cancer, Radioprotective, Antioxidant, Anti-hypertensive and cardioprotective, Anti-microbial, Immunomodulatory, Central nervous system depressant activity, Anti-inflammatory, Anti-arthritic and Anti-coagulant activity.	[13]
	Green Tea	<i>Camelia sinensis</i>	Anti-inflammation, anti-Diabetes, Anti-cancer and Anti-coagulant activity.	[14]
	Thunkuni	<i>Centella asiatica</i>	Sedative, anxiolytic, Anti-depressant, Anti-epileptic, Cognitive and anti-oxidant, Anti-Inflammatory, Antinociceptive,	[15]
	Basaka	<i>Adhatoda zeylanica (Justicia adhatoda)</i>	Anti-bacterial, Anti-cholinesterase, hypoglycemic, Anti-tussive, Cardioprotective, Anti-inflammatory, Anti-ulcer, Anti-mutagenic and Anti-tubercular activity.	[16]
	Green chiretta (Kalmegh)	<i>Andrographis paniculata</i>	Immunological potential, Anti-cancer, Anti-inflammatory, Anti-angiogenic, Anti-hyperglycemic, Anti-malarial and Cardiovascular activity.	[17]
	Kulekhara	<i>Hygrophila Spinosa</i>	Anti-tumor, Anti-inflammatory, Anti-pyretic, Diuretic, Anti-diabetic, Anthelmintic, Anti-bacterial, Analgesic, and Anti-oxidant activity.	[18]
	Neem	<i>Azadirachta indica</i>	Anti-diabetic, Anti-inflammatory, Antihemorrhagic, Analgesic, antipyretic, Kidney damage, Anti-ulcer, Anti-bacterial, Anti-fungal and Anti-viral activity.	[19]
	Brahmi	<i>Bacopa monnieri</i>	Anti-asthmatic, Anti-cancer, Anticonvulsive, Antidepressant, Anti-inflammatory, Anti-oxidant, Anti-spasmodic, Anti-bacterial, Anti-fungal and Gastroprotective activity.	[20]
	Tejpatta	<i>Cinnamomum tamala</i>	Antioxidant, Anti-diabetic, Anti-cancer, Hepatoprotective, Anti-inflammatory, Antidiarrheal AND Anti-microbial activity.	[21]
	Beal Leaves	<i>Aegle marmelos</i>	Anti-bacterial, Anti-fungal, Anti-viral, Anti-inflammatory, Hepatoprotective, Antidiarrheal and Anti-Diabetic	[22]
	Marigold	<i>Tagetes erecta</i>	Antibacterial, Antinociceptive, Anti-Inflammatory, Anti-oxidant, Hepatoprotective, Anti-cancer, Antiepileptic, Anti-diabetic, Anti-depressant and Anti-fungal activity	[23]

SI No.	Common name	Scientific name	Pharmacological property	Reference
	Mango leaves	<i>Mangifera indica</i>	Anticancer, Antidiabetic, Anti- inflammatory, Hepatoprotective, Anti-hemorrhagic, Anti-tetanus, Analgesic and Antipyretic, Antiulcer, Anti- diarrheal, Antibacterial, Anti- fungal, Antiviral, Anthelmintic, Antimalarial, Bronchodilatory and laxative activity	[24]
	Lemon leaf	<i>Citrus Limon</i>	Anti-Bacterial, Anti-Fungal , Sedative, Anxiolytic and antidepressant, Anti-Inflammatory and Antioxidant, Anti-cancer	[25]
	Bamboo	<i>Bambusa vulgaris</i>	Anti-cancer, Anti-oxidant, Anti- ulcer, Anti-inflammatory, Anti- diabetes, Anti-microbial and Anti-fertility.	[26]
	Aloe vera	<i>Aloebarbaden sis miller</i>	Burn and wound healing property, Moisturizing and anti-aging, Immune system restoration, Anti- inflammatory, Anti-diabetic, Anti- mutagenic Anti-oxidant, laxative and Antiseptic	[27]
	Palong Sak	<i>Spinacia oleracea</i>	Anti-oxidant, Anti-inflammatory, Protection against gamma radiation. Anti-cancer, Inhibition of mammalian DNA polymerase, Hepatoprotective and CNS depressant activity.	[28]
	Paan Leaves	<i>Piper betle</i>	Anti-bacterial, Anti-microbial, Analgesic, Anti-inflammatory, Anti- oxidant, Anti-diabetic, Antiproliferation and hepatoprotective.	[29]
	Nayantara	<i>Catharanthus roseus</i>	Anti-cancer, Anti-diabetic, Anti- microbial, Anti-oxidant, Anti- helminthic, Anti-ulcer, Hypotensive, Anti-diarrheal and hypolipidemic activity.	[30]
	Pudina	<i>Mentha arvensis</i>	Anti-oxidant, Anti-fertility, Anti- emetic, Antidepressant, Analgesic, Anti-allergic activity, Anti- inflammatory, Radioprotective, Anti-ulcer and Anti-cancer activity.	[31]
	Wild piper	<i>Piper sarmentosum</i>	Acute toxicity, Anti-oxidant, Anti- bacterial, Anti-microbial, Anti- fungal, Anti-tuberculosis, Anti- malarial, Anti-plasmodial, Anti- dengue, Hypoglycemic Anti- inflammatory and Antipyretic and Anticarcinogenic activity.	[32]
	Tamarind (Tetul leaf)	<i>Tamarindus indica</i>	Anti-oxidant, Anti-microbial, Anti- elmintic, Antidepressant, Analgesic, Anti-diabetic, Anti-inflammatory, hepatoprotective, Antihistamine,	[33]
	Bermuda grass (Durba grass)	<i>Cynodon dactylon</i>	Anti-oxidant, Anti-microbial, Anti- cancer, Antidepressant, Analgesic, Anti-diabetic, Anti-inflammatory, hepatoprotective, Anticonvulsant, Antitumor, hypotensive effect, Antiemetic and bronchodilatory activity	[34]

SI No.	Common name	Scientific name	Pharmacological property	Reference
	Arjun plant	<i>Terminalia arjuna</i>	Anti-mutagenic, Anti-bacterial, Anti-oxidant, Anti- microbial, Anti-inflammatory, Anti-is-chemic Anti-cancer and Anti-microbial activity.	[35]
	Cannabis	<i>Cannabis sativa</i>	analgesic, anxiolytic, anticonvulsant, anti- depressant, antiemetic, antifungal, antihyperten-sive, anti-inflammatory, anti-melanogenesis, antimicrobial, antioxidant, antiproliferative, antipru-ritic, anti-spas-modic, antitumor, cytotoxic, expectorant, gastroprotective, and numerous activity	[36]
	Ashwagandha	<i>Withania somnifera</i>	Anti-inflammatory, Anti-stress, Anti-biotic, Anti-oxidant, Anti- aging, Anti-convulsant, Anti- parkinsonian, Cardiovascular, Im-munomodulatory, Anti- hyperglycemic, Anti-in-flammatory and Anti Carcinogenic	[37]
	Watermelon	<i>Citrullus lanatus</i>	Anti-inflammatory, Anti-hyperlipidemic , Anal-gesic, Anti-ulcerative, Antisecretory, Anti-biotic, Gastroprotective and antifilarial	[38]
	Apple	<i>Malus seiversil</i>	Anti-oxidant, Antiobesity, Anti-cholesterol, Anti-cancer, Anti-microbial, Enzyme inhibitor,	[39]
	Banana leaf	<i>Musa balbisiana</i>	Anti-bacterial, Anti-oxidant, Anti- microbial, Anti-inflammatory, Anti-ischemic Anti-cancer	[40]
	Zinger	<i>Zingiber officinale</i>	Anti-bacterial, Anti-oxidant, Anti- microbial, Anti-inflammatory, Anti-cancer , Hypoglycemic and hyperglycemic activity.	[41]
	Beal	<i>Aegle marmelos</i>	Diarrohoea and dysentery, Anti-Diabetes, Anti-microbial activity, Anti-cancer activity, Cardio-protective effect, Anti-hyperlipidemic activity, Anti-ulcer activity, Antipyretic or anti-inflam-matory activity	[42]
	Pomegranate	<i>Punica granatum</i>	Antiviral and anti-COVID-19 potential, Anti-malaria properties, Anti-obesity properties, Toxi-cological properties and antigenotoxic activity Anti-Diabetes, Anti-microbial activity, Anti-can-cer activity, Anti-hyperlipidemic Anti-pyretic or anti-inflammatory activity	[43]
	Carrot	<i>Daucus carota</i>	Anti-oxidant, Anti-microbial, Anti- cancer, An-tidepressant, Analgesic, Anti-diabetic, Anti-in-flammatory, ,Anti-ulcer, Sedative, anti-fungal	[44]
	pea	<i>Pisum sativum</i>	Anti-oxidant, Anti-microbial, Anti- cancer, An-tidepressant, Analgesic, Anti-diabetic, Anti-in-flammatory, anti-fungal Activity	[45]
	Coffee leaf	<i>Coffea arabica</i>	Anti-oxidant, Anti-microbial, Anti- cancer, An-tidepressant, Analgesic, Anti-diabetic, Anti-in-flammatory, anti-fungal Activity, Anti-diabetic	[46]
	China rose	<i>Hibiscus Rosa sinensis</i>	Anti-oxidant, Anti-microbial, Anti- cancer, , Analgesic, Anti-diabetic, Anti-inflammatory, anti-fungal Activity, Anti-convulsant, Anti-anxi-ety, Anti ulcer activity.	[47]

Sl No.	Common name	Scientific name	Pharmacological property	Reference
	Rose	<i>Rosa damascena</i>	Anti-oxidant, Anti-microbial, Anti- cancer, Analgesic, Anti-diabetic, Anti-inflammatory, cardiovascular function, Anti-Hiv effect.	[48]
	Nishagandhi	<i>Epiphyllum Oxypetalum</i>	Anti-oxidant, Anti-microbial, Anti- cancer, Antidepressant, Anti-inflammation Activity, Anti-Bacterial.	[49]
	Lily flower	<i>Lilium candidum</i>	anti-tumor, hypoglycemic, antibacterial, anti-oxidation, anti-depression and anti-inflammatory. Anti-oxidant, Anti-microbial , Anti-Bacterial.	[50]
	Devdaru leaf	<i>Cedrus Deodera</i>	Anti-fungal, Anti-tumor, Anti-tubercular, Neuroleptic, Antioxidant, Anti-bacterial, Kidney and gastrointestinal disorder.	[51]
	Cherry fruit	<i>Prunus Avium</i>	Antigenotoxic, Anti-cancer, diuretic, Anti-oxidant, Anti-microbial, Anti-inflammatory, Neuro-protective activity	[52]

CONCLUSION: -

Medicinal herbal plants are important natural resources for research in pharmacology and the creation of potential therapeutic agents. The plants discussed in this article display a range of biological activities, such as antimicrobial, antioxidant, anti-inflammatory, antidiabetic, cardioprotective, hepatoprotective, and immunomodulatory effects. These properties are linked to their intricate phytochemical compositions and provide a scientific foundation for exploring their historical medicinal applications. However, the existing evidence differs among various plant species, preparations, and pharmacological activities, with many claimed effects being confined to laboratory or preclinical studies. Thus, traditional usage should not be regarded as adequate proof of clinical effectiveness. Future studies should concentrate on identifying active components, clarifying mechanisms of action, establishing standardized extraction and formulation practices, and performing thorough safety evaluations and controlled clinical trials. Appropriate quality control, regulatory compliance and monitoring of herb–drug interactions are also essential. Integrating validated traditional knowledge with modern pharmaceutical research may support the responsible development of safe, effective and evidence-based herbal medicines for healthcare applications.

REFERENCES

1. Jamshidi, N., & Cohen, M. M. (2017). The clinical efficacy and safety of tulsi in humans: A systematic review of the literature. Evidence-Based Complementary and Alternative Medicine, 2017, 9217567. <https://doi.org/10.1155/2017/9217567>.
2. An Assessment of Pharmacological Profile of Selected Indian Traditional Medicinal Plants. International Journal of Pharmaceutical Sciences. Available at: <https://www.ijpsjournal.com/article/an-assessment-of-pharmacological-profile-of-selected-indian-traditional-medicinal-plants>.
3. World Health Organization. (2025). Traditional medicine: Questions and answers. <https://www.who.int/news-room/questions-and-answers/item/traditional-medicine>.
4. National Center for Complementary and Integrative Health. Aloe Vera: Usefulness and Safety. <https://www.nccih.nih.gov/health/aloe-vera>.
5. National Center for Complementary and Integrative Health. Ashwagandha: Usefulness and Safety. <https://www.nccih.nih.gov/health/ashwagandha>.
6. National Center for Complementary and Integrative Health. Turmeric: Usefulness and Safety. <https://www.nccih.nih.gov/health/turmeric>.
7. National Center for Complementary and Integrative Health. Garlic: Usefulness and Safety. <https://www.nccih.nih.gov/health/garlic>.



8. Ekor M. The growing use of herbal medicines: issues relating to adverse reactions and challenges in monitoring safety. *Front Pharmacol.* 2014;4:177. doi:10.3389/fphar.2013.00177.
9. Posadzki P, Watson L, Ernst E. Adverse effects of herbal medicines: an overview of systematic reviews. *Clin Med (Lond).* 2013;13 (1):7-12.
10. Fabricant DS, Farnsworth NR. The value of plants used in traditional medicine for drug discovery. *Environ Health Perspect.* 2001;109 Suppl 1:69-75.
11. Newman DJ, Cragg GM. Natural products as sources of new drugs over the nearly four decades from 01/1981 to 09/2019. *J Nat Prod.* 2020;83 (3):770-803. doi:10.1021/acs.jnatprod.9b01285.
12. Evans WC. Trease and Evans pharmacognosy. 16th ed. Edinburgh: Saunders Elsevier; 2009.
13. Harborne JB. Phytochemical methods: a guide to modern techniques of plant analysis. 3rd ed. London: Chapman & Hall; 1998.
14. Jamshidi N, Cohen MM. The clinical efficacy and safety of tulsi in humans: a systematic review of the literature. *Evid Based Complement Alternat Med.* 2017;2017:9217567. doi:10.1155/2017/9217567.
15. Pattanayak P, Behera P, Das D, Panda SK. *Ocimum sanctum* Linn. A reservoir plant for therapeutic applications: an overview. *Pharmacogn Rev.* 2010;4 (7):95-105. doi:10.4103/0973-7847.65323.
16. Saleem S, Muhammad G, Hussain MA, Bukhari SN. A comprehensive review of phytochemical profile, bioactives for pharmaceuticals, and pharmacological attributes of *Azadirachta indica*. *Phytother Res.* 2018;32 (7):1241-1272. doi:10.1002/ptr.6076.
17. Biswas K, Chattopadhyay I, Banerjee RK, Bandyopadhyay U. Biological activities and medicinal properties of neem (*Azadirachta indica*). *Curr Sci.* 2002;82 (11):1336-1345.
18. Shamsuddin T, Alam MS, Junaid M, Akter R, Hosen SMZ, Ferdousy S, et al. *Adhatoda vasica* (Nees.): a review on its botany, traditional uses, phytochemistry, pharmacological activities and toxicity. *Curr Pharm Des.* 2021;27 (14):1925-1964. doi:10.2174/1389557521666210226152238.
19. Hewlings SJ, Kalman DS. Curcumin: a review of its effects on human health. *Foods.* 2017;6 (10):92. doi:10.3390/foods6100092.
20. Akram M, Uddin S, Ahmed A, Usmanhane K, Hannan A, Mohiuddin E, et al. Curcuma longa and curcumin: a review article. *Rom J Biol Plant Biol.* 2010;55 (2):65-70.
21. Gupta SC, Patchva S, Koh W, Aggarwal BB. Discovery of curcumin, a component of golden spice, and its miraculous biological activities. *Clin Exp Pharmacol Physiol.* 2012;39 (3):283-299. doi:10.1111/j.1440-1681.2011.05648.x.
22. Ali BH, Blunden G, Tanira MO, Nemmar A. Some phytochemical, pharmacological and toxicological properties of ginger (*Zingiber officinale* Roscoe): a review of recent research. *Food Chem Toxicol.* 2008;46 (2):409-420. doi:10.1016/j.fct.2007.09.085.
23. Grzanna R, Lindmark L, Frondoza CG. Ginger—an herbal medicinal product with broad anti-inflammatory actions. *J Med Food.* 2005;8 (2):125-132. doi:10.1089/jmf.2005.8.125.
24. Chacko SM, Thambi PT, Kuttan R, Nishigaki I. Beneficial effects of green tea: a literature review. *Chin Med.* 2010;5:13. doi:10.1186/1749-8546-5-13.
25. Cabrera C, Artacho R, Giménez R. Beneficial effects of green tea—a review. *J Am Coll Nutr.* 2006;25 (2):79-99. doi:10.1080/07315724.2006.10719518.
26. Khan N, Mukhtar H. Tea polyphenols for health promotion. *Life Sci.* 2007;81 (7):519-533. doi:10.1016/j.lfs.2007.06.011.
27. Surjushe A, Vasani R, Saple DG. Aloe vera: a short review. *Indian J Dermatol.* 2008;53 (4):163-166. doi:10.4103/0019-5154.44785.
28. Hamman JH. Composition and applications of Aloe vera leaf gel. *Molecules.* 2008;13 (8):1599-1616. doi:10.3390/molecules13081599.
29. Dat AD, Poon F, Pham KBT, Doust J. Aloe vera for treating acute and chronic wounds. *Cochrane*

- Database Syst Rev. 2012; (2):CD008762. doi:10.1002/14651858.CD008762.pub2.
30. Singh N, Bhalla M, de Jager P, Gilca M. An overview on ashwagandha: a Rasayana (rejuvenator) of Ayurveda. Afr J Tradit Complement Altern Med. 2011;8 (5 Suppl):208-213. doi:10.4314/ajtcam.v8i5S.9.
31. Chandrasekhar K, Kapoor J, Anishetty S. A prospective, randomized double-blind, placebo-controlled study of safety and efficacy of a high-concentration full-spectrum extract of ashwagandha root in reducing stress and anxiety in adults. Indian J Psychol Med. 2012;34 (3):255-262. doi:10.4103/0253-7176.106022.
32. Russo A, Borrelli F. Bacopa monniera, a reputed nootropic plant: an overview. Phytomedicine. 2005;12 (4):305-317. doi:10.1016/j.phymed.2003.12.008.
33. Gohil KJ, Patel JA, Gajjar AK. Pharmacological review on Centella asiatica: a potential herbal cure-all. Indian J Pharm Sci. 2010;72 (5):546-556. doi:10.4103/0250-474X.78519.
34. Brinkhaus B, Lindner M, Schuppan D, Hahn EG. Chemical, pharmacological and clinical profile of the East Asian medical plant Centella asiatica. Phytomedicine. 2000;7 (5):427-448. doi:10.1016/S0944-7113 (00)80065-3.
35. Akbar S. Andrographis paniculata: a review of pharmacological activities and clinical effects. Altern Med Rev. 2011;16 (1):66-77.
36. Poolsup N, Suthisisang C, Prathanturug S, Asawamekin A, Chanchant P. Andrographis paniculata in the symptomatic treatment of uncomplicated upper respiratory tract infection: systematic review of randomized controlled trials. J Clin Pharm Ther. 2004;29 (1):37-45.
37. Suksomboon N, Poolsup N, Boonkheaw S. Effect of Andrographis paniculata on blood glucose and lipid profiles in patients with type 2 diabetes: a systematic review and meta-analysis. J Ethnopharmacol. 2014.
38. Khare CP, editor. Indian medicinal plants: an illustrated dictionary. New York: Springer; 2007.
39. Kirtikar KR, Basu BD. Indian medicinal plants. 2nd ed. Dehradun: International Book Distributors; 1987.
40. Williamson EM. Major herbs of Ayurveda. Edinburgh: Churchill Livingstone; 2002.
41. Maity P, Hansda D, Bandyopadhyay U, Mishra DK. Biological activities of crude extracts and chemical constituents of Bael, Aegle marmelos (L.) Corr. Indian J Exp Biol. 2009;47 (11):849-861.
42. Parvez GM. Pharmacological activities of mango (Mangifera indica): a review. J Pharmacogn Phytochem. 2016;5 (3):1-7.
43. van der Heijden R, Jacobs DI, Snoeijer W, Hallard D, Verpoorte R. The Catharanthus alkaloids: pharmacognosy and biotechnology. Curr Med Chem. 2004;11 (5):607-628.
44. Guha P. Betel leaf: the neglected green gold of India. J Hum Ecol. 2006;19 (2):87-93.
45. Cowan MM. Plant products as antimicrobial agents. Clin Microbiol Rev. 1999;12 (4):564-582. doi:10.1128/CMR.12.4.564.
46. Daglia M. Polyphenols as antimicrobial agents. Curr Opin Biotechnol. 2012;23 (2):174-181. doi:10.1016/j.copbio.2011.08.007.
47. Chanda S, Rakholiya K. Combination therapy: synergism between natural plant extracts and antibiotics against infectious diseases. In: Méndez-Vilas A, editor. Science against microbial pathogens: communicating current research and technological advances. Badajoz: Formatex Research Center; 2011. p. 520-529.
48. Prior RL, Wu X, Schaich K. Standardized methods for the determination of antioxidant capacity and phenolics in foods and dietary supplements. J Agric Food Chem. 2005;53 (10):4290-4302. doi:10.1021/jf0502698.
49. Blois MS. Antioxidant determinations by the use of a stable free radical. Nature. 1958;181:1199-1200. doi:10.1038/1811199a0.
50. Brand-Williams W, Cuvelier ME, Berset C. Use of a free radical method to evaluate antioxidant activity. LWT Food Sci Technol. 1995;28 (1):25-30. doi:10.1016/S0023-6438 (95)80008-5.



51. Benzie IFF, Strain JJ. The ferric reducing ability of plasma (FRAP) as a measure of antioxidant power: the FRAP assay. *Anal Biochem.* 1996;239(1):70-76. doi:10.1006/abio.1996.0292.
52. Singleton VL, Orthofer R, Lamuela-Raventós RM. Analysis of total phenols and other oxidation substrates and antioxidants by means of Folin-Ciocalteu reagent. *Methods Enzymol.* 1999;299:152-178. doi:10.1016/S0076-6879(99)99017-1.

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