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Application Of Medicinal Herbs In Drug Discovery

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ABSTRACT

In general, traditional herbal treatments are safe and effective for treating a broad variety of conditions, whether they are acute or chronic. They have played a crucial role in the advancement of medical treatment all around the globe. Diseases and conditions include high blood pressure, diabetes, cancer, diabetes mellitus, sluggish wound healing, asthma, pharyngitis, and tuberculosis are sometimes treated using herbal plants as a natural alternative (TB). Due to their various pharmacological qualities, plants containing bioactive phylomedicine components as alkaloids, flavonoids, tannins, and polyphenols have been utilized to cure ailments. For a long time, India has been recognized as a source of several beneficial plants, and many herbal medical practices have been recognized as "living traditions." However, there is no information on the most important medicinal plants used in India or the present status of research into these plants. Therefore, the primary purpose of this study is to identify and summaries the most widely cultivated Indian medicinal herbs. For this purpose, we shall review articles from scholarly journals in India and beyond. This study focuses mostly on the most popular Indian medicinal plants, their extracts, and the pharmacological qualities they possess, including those that are antimicrobial, anti-oxidant, anti-diabetic, anti-cancer, etc. This research aims to provide a comprehensive scientific evaluation of the most important phyto compounds and their pharmacological effects, paving the way for the development of novel ethno medicine.

Keywords: Medicinal plants, Phytochemistry, Bioactive compounds, Phytochemical

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INTRODUCTION

For than 1000 years, many plant species have been used to generate medicinal compounds, and most medications today are plant-derived. Reports of 2600 BC herbal draughts and ancient Mesopotomia medicinal plant records have opened the door to plant-based medication research. The 2900 BC Egyptian "Ebers Papyrus" contains 700 plant-based medications. Traditional Chinese medicine and Indian Ayurveda were documented circa 1st century BC [1]. Global medicinal plant diversity is extraordinary. 70,000 plant species, ranging from lichens to trees, have been shown to heal various ailments [2]. WHO lists 21,000 medicinal plants. Even now, rural herbalists use over 2500 herbs to cure fundamental illnesses, which is regarded one of the greatest Indian medicinal traditions. [3] India has about 100 genera of medicinal plants utilized worldwide. India exports the second-most medicinal plants. It includes 16 agro-climatic zones and 45,000 plants, 7000 of which are medicinal [4].

Phytochemical effectiveness

Statistics show that around 80% of the world's population uses some form of herbal medicine or traditional remedy, such as morphine, codeine, camptothecin, taxol, allicin, artemisinin, quinine, colchicines, quinidine, quinine.The quantity and quality of a plant's active component, often a secondary metabolite, are influenced by its environment [5]. In plants, there are two types of metabolites: main and secondary. Amino acids, proteins, glucose, nucleic acids, and polysaccharides are all examples of primary metabolites that are essential for a cell's growth and maintenance. Secondary metabolites that come from basic metabolic pathways do not have any effect on growth. Because they have biological effects, secondary metabolites are used in traditional medicine [6]. Plant metabolites include terpenoids, alkaloids, and phenolics. About 40,000 compounds make up terpenoids, and over 8000 make up phenolics [7].

Quercetin

Apples, grapes, red raspberries, shallots, cabbage, vegetables, and nuts are good sources of the flavonoid quercetin. Inhibiting metastases and stimulating apoptosis [8, 9] are two of quercetin's functions. Quercetin's potential to reduce the severity of degenerative diseases such atopic dermatitis, renal fibrosis, myocarditis, and neurological disorders, as well as cardiovascular disease and cancer [10], is supported by its biological and pharmacological activities. [11] Found that quercetin stops PTHR1 from working and stops cell growth and death in U2OS and Saos2 human metastatic osteosarcoma cells.

Ferulic acid

Herbal plants contain much of phenolic ferulic acid (FA). FA possesses anti-inflammatory, antioxidant, anticancer, and antidiabetic effects [12]. FA is prooxidant, antioxidant, and antibacterial against all pathogens [13]. Researchers Guvvala et al. observed that FA shields

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the male genital system from arsenic's toxicity, reducing testicular damage and oxidative stress. Improved sperm quality was achieved by regulating the expression of the genes Nfe2l2, Ppargc1a, and StAR [14].

Curcumin

Turmeric rhizomes are the primary source of curcumin, a bioactive polyphenolic chemical (*Curcuma longa*). Anti-inflammatory, antioxidant, and anticancer effects are well established. Curcumin has been shown to protect against life-threatening disorders in animal models, including AD, PD, depression, multiple sclerosis, ischemic stroke, and others [15]. Curcumin prevents stomach cancer in many trials. Oral curcumin reduced carcinogenesis and growth in gastric cancer animal models [16]. Curcumin reduced liver TG in high-fat diet-fed rats, according to Mahmoud et al. [17]. Curcumin inhibited HeLa cervical cancer cells in Ghasemi et al. Curcumin reduced cancer cell proliferation at 34.23 μM/ml. In high-fat diet-fed rats, liver TG content decreased considerably. Curcumin stops cervical cancer cells from spreading, growing, and killing people [18].

Myricetin

Bioactive flavonoid myricetin is found in grapes, oranges, berries, and tea. Myricetin stops inflammation, fights free radicals, and kills cancer cells. Myricetin stops cancer from growing and causes cancer cell lines from the stomach (HGC-27 and SGC7901), oesophagus, ovary, colon, and cervical areas to die (HeLa). It stopped -amylase and -glucosidase from working, which made it good for T2DM [19]. Myricetin's ability to prevent blood-brain barrier disruption due to ischemia/reperfusion (I/R) damage was investigated in in vitro models of brain microvessel endothelial injury (BBB). Human brain microvessel endothelial cells may produce pro-inflammatory cytokines such tumour necrosis factor alpha, interleukin 1, and interleukin 6 in response to oxygen-glucose deprivation and reoxygenation (OGD/R). Myricetin significantly reduced TNF-, IL-1, and IL-6 after OGD/R induced injury to HBMEC[20]. luteolin Broccoli, celery, pepper, and thyme are good sources of the flavonoid luteolin. In hepatocellular carcinoma (HCC) cells, it activates p53 and autophagy [21]. Luteolin has properties that make it an antioxidant, reduce inflammation, fight cancer, and help treat diabetic nephropathy [22]. Wang et al. showed that luteolin caused esophageal cancer cells Eca109 to die. Through the expression of mRNA and proteins for caspase3 and caspase9, luteolin speeds up the death of Eca109 esophageal cancer cells [23].

Luteolin

Broccoli, celery, pepper, and thyme all contain the flavonoid luteolin. In hepatocellular carcinoma (HCC) cells, it activates p53 and autophagy, preventing malignancy. [24] Antioxidant, anti-inflammatory, anticancer, and antidiabetic treatment for diabetes nephropathy are only some of the pharmacological and biological properties of luteolin. [25] Eca109 cells, a kind of esophageal cancer, also undergo apoptosis as a result. Increasing

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expression of the death-inducing genes caspase-3 and caspase-9 is one way in which luteolin promotes cell death in Eca109 esophageal cancer cells.

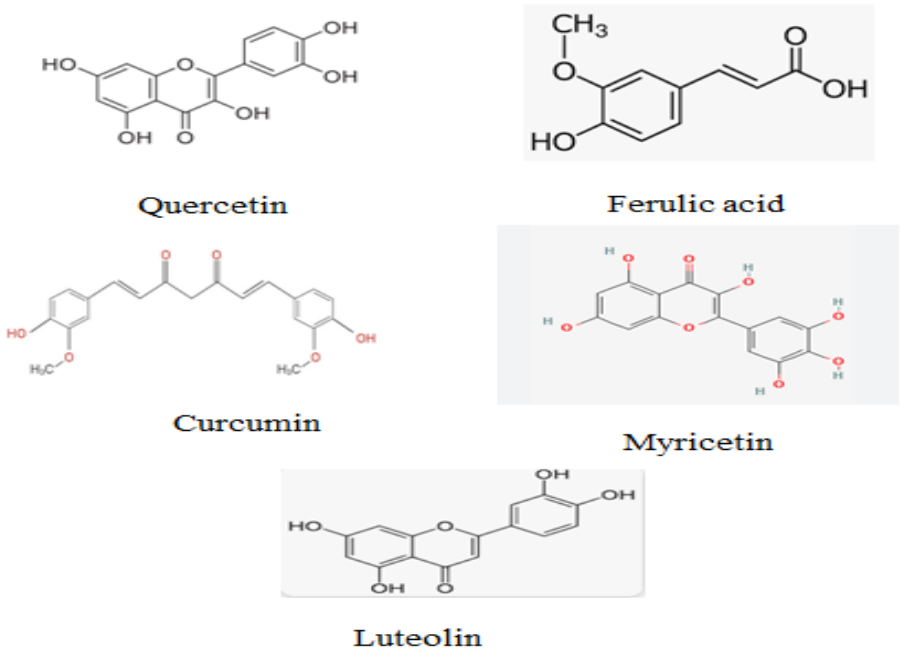

Fig :1 Essential phytochemicals from Indian medicinal plants

Indian herbs

Abutilon indicum

A fragrant *Malvaceae* plant called "Country mallow" or "Atibala" in Sanskrit is *Abutilon indicum (L.).* India, Bangladesh, Pakistan, and Sri Lanka cultivate it. *A. indicum* treats worms, nausea, infections, inflammation, infertility, asthma, and fever [26]. Extracts cure wounds, ulcers, vaginal and urinary infections, diabetes, piles, and haemorrhoids. Extracts may treat wounds, ulcers, vaginal infections, diabetes, UTIs, piles, and haemorrhoids. Leaf extracts lowered blood sugar and preserved the liver [27]. It treats colds, high fever, mumps, TB, bronchitis, carbuncles, diarrhoea, and worm illnesses locally. Demulcent leaves treat eyewash, mouthwash, toothache, sore gums, and gonorrhoea [28]. In the flower extract, Matlawska and Sikorska detected phytochemical constituents/flavonoids such luteolin, chrysoeriol 7-O—glucopyransoside, apigenin, luteolin, quercetin 3-O—glucopyransoside, and chrysoriol.

Thespesia populnea

Malvaceae) are tropical and coastal Indian trees. *Thespesia populnea Soland ex.* Its name is "Indian tulip tree." Ayurvedic writings mention *T. populnea's* therapeutic powers (Dravyaguna). Plant parts treat scabies, psoriasis, worms, liver disorders, dysentery, and

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cholera [29,30].The bark oil and vegetable oil heal gonorrhoea and urethritis. Traditional medicine uses the oil for fractures, ulcers, and boils [31]. [32] found antihyperglycemic, hepatoprotective, antinociceptive, anti-inflammatory, and antidiarrheal effects. *T. populnea's* main component, gossypol, is antiviral and anticancer. Rats and humans revealed anti-inflammatory and antifertility effects. Gossypol is being tested as an anticancer treatment in advanced cancer patients due to its strong affinity for apoptotic proteins Bcl-2 and Bcl-xL [33,34]. Quinines from The duramen found in *T. populnea* are mansonone-d, mansonone-H, thespone, and thespesone [35].

Solanum surattense

The weed *Solanum Solanaceae Burm. f.* (S. surattense) grows all year long. It happens often in India's tropical areas [36]. Indian nightshade (*S. surattense*), also called yellow-berried nightshade, has been used to treat diabetes, asthma, fever, and cough, especially in south India [37]. S. surattense is used to treat leprosy, asthma, and constipation. It works against both malaria and free radicals. Diabetes-affected rats were used to prove that the fruits of S. surattense have important anti-diabetic effects. S. surattense ethanolic and methanolic extracts killed *P. aeruginosa* and healed wounds [38]. Muruhan et al. found that S. surattense's alcoholic leaf extract was antioxidant. Alkaloids, flavonoids, tannins, glycosides, triterpenoids, and sterols in the extract may explain this. DPPH and ABTS assessed plant extract antioxidant power. Plant extract phenolics totaled 46.7 mg gallic acid equivalents. Antioxidant action may come from many phenolic molecules [39].

Picrorhiza kurroa

Picrorhiza "Kutki," "Kurro," and "Indian gentian" describe Royle ex Benth. 3000–5000 m in the northeastern Himalayas [40]. This perennial cures liver and respiratory issues. It treats diarrhoea, scorpion, and persistent fever. Hepatoprotective, anti-inflammatory, antioxidant, and anti-cancerous iridoid glycosides from the plant. *Picrorhiza* has 22 iridoid glycosides, including bartsioside, mussaenosidic acid, boschnaloside, kutkin, kutkoside, picroside V, and pikuroside [41]. Monoterpene isoprene biosynthesizes iridoid glycosides. Glycosides kill bugs. Scientific findings inspired PicrolivR and PicrolaxR capsule and suspension. Picroliv-R cures liver illnesses and Picrolax-R acute sporadic constipation. Monotherapy with P. kurroa crude rhizome powder improved respiratory symptoms in obstructive airway disease patients.

Cyperus rotundus

Nutgrass (*Cyperus rotundus L.)* is nagarmotha. The *Cyperaceae* plant C. rotundus grows in Asia and sometimes in tropical and subtropical areas. Straight, thin, perennial grass with roots that grow underground. The outside of the tubers is blackish, and the inside is reddish-white. In Indian Ayurveda, tubers are mostly used for their stimulating, diuretic, antispasmodic, and calming effects. [42,43] Carrageenan-caused edoema in albino rats is stopped by rhizome extract made of petroleum ether. Like acetylsalicylic acid, it relieves pain and brings down fever. Puratchikody et al. found that *C. rotundus* tuber alcoholic extract helped male Wistar

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albino rats repair wounds. Compared to nitrofurazone [44], the 2% w/w *C. rotundus* alcoholic extract ointment healed all wounds in 18 days.

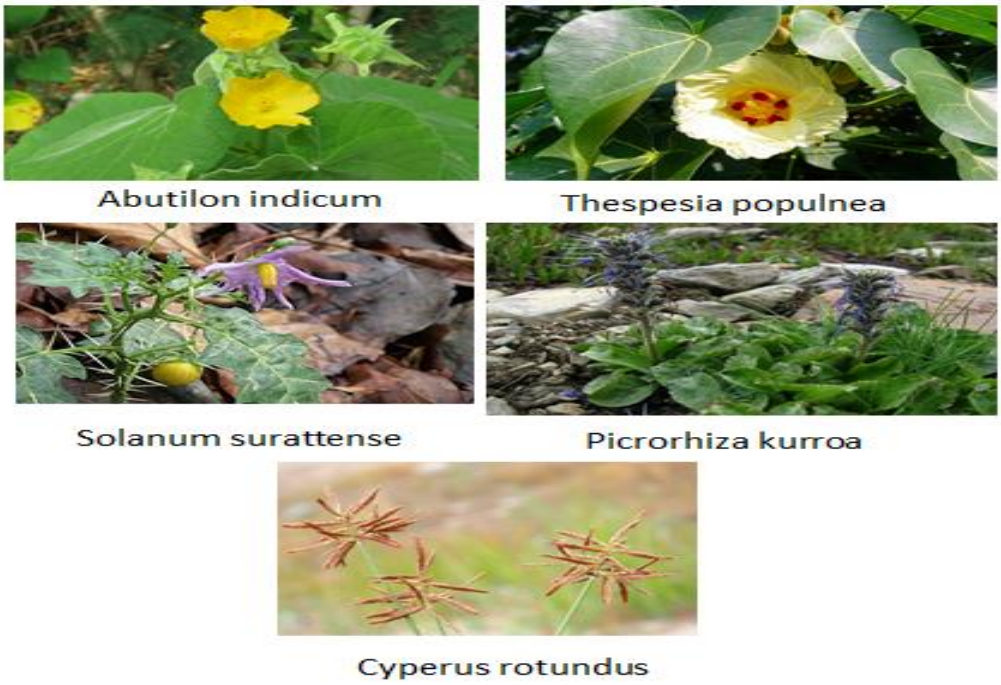

Fig: 2 Select Indian medicinal plants with various medical characteristics.

CONCLUSION

Indian herbal plant literature may mention a combination of plants or the various ways a single plant may heal an illness. Fairly, there is little study on the clinical effectiveness of popularly used Indian herbal plants in terms of plant parts, screened phyto compounds, and hypothesized linkages between phyto compounds and clinical applications. This study examines the components, screening metabolites, and therapeutic performance of India's most widely used herbal plants, which are grown year-round and utilized for wound healing and cancer treatment. The report includes medicinal plant research. Today's knowledge of allopathic drug side effects helps us comprehend and employ plant-based health solutions.

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