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## Study of Medicinal Plants and Their Therapeutic Applications

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### Abstract

The medicinal qualities of plants are utilized to treat a wide range of illnesses. In this study, the therapeutic potential and micropropagation of a few medicinal plants that are now under threat were examined. Records of medicinal plants from the ancient Mesopotamian period and reports of written manuscripts about the therapeutic qualities of herbs dating back to 2600 BC have made it feasible to create medications based on plants and natural goods. A number of environmental, social, economic, and institutional problems are posing a danger to medicinal plants, making their preservation increasingly crucial. Due to habitat deterioration and overexploitation, several species of medicinal plants are in danger of going extinct. Plants are often used as stores of bioactive compounds due to their medicinal properties. Medicinal plants play a crucial part in curing the majority of ailments as many human issues are resolved with medications made from plant ingredients. Many different diseases are treated and cured with the help of medicinal plants, which contain a multitude of bioactive compounds.

**Keywords:** Medicinal, plants, therapeutic, pharmacological and herbs

### Introduction

A medicinal plant is one that has the potential to treat illness or injury or that has positive pharmacological effects on humans. Alkaloids, sterols, saponins, glycosides, quinines, resins, lactones, and volatile oils are some of the secondary metabolites that medicinal plants produce and store naturally. From People have used medicinal herbs for healing since prehistoric times. There is documentation of plant medicine in ancient Egyptian papyrus hieroglyphics and Chinese texts. Herbal treatments have long been an integral part of traditional medicine, both in indigenous African and American systems and in more modern ones, such as the Indian ayurvedic and traditional Chinese systems. The same or comparable plant parts were employed by individuals from different regions of the globe to cure the same disease, according to researchers. According to recent estimates According to the World Health Organization (WHO), 75% of people worldwide receive their primary medical care from herbal treatments. There are estimated 600–700 herbal treatments available in

countries like the UK and Germany, and over 70% of doctors in Europe prescribe them.

The usage of natural remedies has increased. in the US in the past fifteen years, driven by a combination of public unhappiness with allopathic medicine's adverse effects and high prescription costs and a desire to revert to more natural and organic treatment methods. The last 30 years have seen a meteoric rise in the worldwide demand for and use of medicinal herbs. Everyone now agrees that traditional health systems and medicinal plants are key to improving health care and that medicinal plants are safe and effective in treating a wide range of illnesses. This increased knowledge is fueling a meteoric rise in the global commerce of therapeutic plants. To protect locals' rights in relation to IP and forestall harm to both people and the environment, it is important to record traditional knowledge. Research into medicinal plants and associated expenses can both benefit greatly from the incorporation of traditional knowledge into sustainable forest management practices. A sustainable forest management plan is crucial for the restoration and

protection of wild variety, and traditional knowledge about the habitat, habits, and usage patterns of wild plants is a vital part of this strategy.

Most of the medications used today are natural chemicals derived from plants, and this trend has persisted for almost a millennium. Many plant species have been evaluated for use as therapeutic agents. Possible medication creation based on plants and natural products has been made possible by reports of the presence of written drafts dated 2600 BC regarding the therapeutic properties of herbs, as well as the records of medicinal plants from the ancient Mesopotamian period. One of the best-preserved records of traditional Egyptian medicine is the "Ebers Papyrus," which dates back to 2900 BC and includes 700 different medications made from plants. Ayurveda, an ancient Indian medical system, and traditional Chinese medicine both have a documented history that begins in the first millennium BC. The incredible variety of medicinal plants found all across the globe is truly astounding.

From the lowest lichens to the tallest trees, there are an estimated 70,000 plant species that have shown promise as a medicine. At least 21,000 different medicinal plants are in use today, according to the World Health Organization (WHO). Traditional herbalists in rural regions continue to use what is widely recognized as one of the most effective systems of Indian medicine—a system based on the use of over 2500 plants to cure common ailments. There are over a hundred plant genera that can be traced back to India and are utilized in traditional medicine all across the globe. When it comes to export rankings, India is second, and it supplies the best quality and quantity of medicinal plants. With its diverse spectrum of 16 agro-climatic zones and around 45,000 plant species, including 7,000 with documented medicinal uses, it is one of the world's 12 major biodiversity hotspots. There is a long history of using natural medications as a countermeasure against many human illnesses. The ongoing use of these medications has amplified their influence on contemporary healthcare systems worldwide.

### Literature Review

Tewari, Devesh *et al.* (2020) <sup>[1]</sup>. Many people in rural Uttarakhand still rely on traditional plant-based remedies for a variety of illnesses. The purpose of this research was to describe traditional plant usage in the Kumaun Himalayan area and to investigate ethnopharmacological data. The research of nine villages in three districts in the western Himalayan area of India's Uttarakhand state is presented here. Methods: Using a semi-structured questionnaire, we questioned 26 traditional healers and long-term residents ranging in age from 30 to 85. Use value (UV) was a quantitative metric used to assess the acquired data. Additionally, for species with UV greater than 0.15, the fidelity level (FL) and informant consensus factor (ICF) were computed. The findings show that 56 different plant species from 34 different groups were documented.

Singh, Shrishti. (2023) <sup>[2]</sup>. The Vedic period marks the beginning of the usage of medicinal herbs. Approximately 80% of the rural Indian population relies on traditional medicine to some extent. The Eastern Himalayas, the Western Ghats, and the Andaman and Nicobar Islands are home to a disproportionately large number of India's 45,000

species of medicinal plants. Traditional healers employ around 6,000 herbs, even though there are only about 3,000 legally recognized medicinal plants. India, sometimes referred to as the "botanical garden of the world," is also the world's leading producer of therapeutic plants. Assuring the safety, efficacy, and quality of medical plants and herbal products is now a major concern in developing nations. Nearly every part of the plant may be used medicinally. Antioxidant, anti-inflammatory, anti-parasitic, anti-hemolytic, antibiotic, insecticidal, and many more qualities are possessed by medicinal plants. All throughout the globe, indigenous communities rely on these.

Ullah, Najeeb *et al.* (2016) <sup>[3]</sup>. The alkaloids in three Mansehra medicinal plants were measured and extracted. For the purpose of extracting various alkaloids, three medicinal plants—*Mentha arvensis*, *Parthenium hysteria*, and a third plant—were powdered and preserved. Using the Soxhlet and Reflux methods, the alkaloids were extracted from *Colchicina* spp. (251 mg), *Mentha arvensis* (67 mg), and *Parthenium hysteria* (67 mg). For example, in the instance of *Mentha arvensis Parthenium hysteria*, the roots had more alkaloids than the stem or leaves, demonstrating that the overall number of alkaloids present in various plant sections may vary significantly. Since the Soxhelt technique was more efficient in extracting alkaloids from various plant sections, it follows that the procedures used in the current investigation also impact the overall quantity of alkaloids. Traditional use of native medicinal herbs and their impact on the pharmaceutical sector. Different metabolic mechanisms synthesize the importance of therapeutic herbs. These chemicals are considered by scientists to be secondary plant products as they do not play a significant role in the plant's ability to survive. Among these chemicals, alkaloids are among the most prominent.

Ozturk, Munir *et al.* (2018) <sup>[4]</sup>. Information on the aromatic and medicinal plants used to cure diabetes in Malaysia, Pakistan, and Turkey is provided in this paper. All, 340 taxa representing 66 families and 185 genera were considered for traditional medicine in Turkey; 281 taxa representing 76 families and 209 genera were considered in Pakistan; and 76 taxa representing 43 groups and 65 genera were considered in Malaysia. The highest number of taxa is found in the following families: In Turkey, there are 49 species of Rosaceae, 48 species of Lamiaceae, 45 species of Asteraceae, 20 species of Apiaceae, and 17 species of Fabaceae. In Pakistan, there are 27 species of Asteraceae, 14 species of Fabaceae, 12 species of Cucurbitaceae, 12 species of Polynuclear, and 11 species of Moraceae. In Malaysia, there are 8 species of Fabaceae, 5 species of Acanthaceae, 4 each of Malvaceae and Phyllanthaceae, and 3 species each of Annonaceae and Zingiberaceae. In Turkey, *Prunus* has eleven taxa, *Thymus* nine, *Quercus* seven, and *Juniperus*, *Hypericum*, *Crataegus*, *Pyrus*, *Rubus*, and *Salvia* six each; in Pakistan, *Ficus* nine, *Artemisia* six, *Phyllanthus* five, *Ziziphus*, *Solanum*, and *Fagonia* four each; and in Malaysia, *Phyllanthus* three, and *Piper*, *Orthosiphon*, *Sindora*, *Allium*, *Annona*, *Terminalia*, and *Cnestis* two each.

Osuntokun, Oludare. (2014) <sup>[5]</sup>. The current research aims to identify the pharmacological, phytochemical, and proximate components of seven medicinal plants native to Nigeria. Sure, the plants are. The taxa include *Acacia albida* Del., *Anchomanes deformers* Engl., *Boscia senegalensis*, *Bridelia*

*ferruginea* Benth., *Ficus ingens* (Miq.) Miq., *Indigofera arrecta* Hochst., and *Moringa oleifera* Lam. The study team used both quantitative and qualitative methods to screen medicinal plants, minerals, anti-minerals, and proximate analytes. All seven of these medicinal plants were shown to contain phytochemicals-alkaloids, phenols, flavonoids, saponins, and tannins-in varying degrees that are beneficial to human health. Additionally, different amounts of minerals and anti-nutrients were found in the seven therapeutic plants. The plants' proximate constituents were also studied, and it was found that these components were present in varied amounts.

### Selective Indian Medicinal Plants

#### *Abelmoschus manihot* (L.) (A. manihot)

Medicus, found in China, India, New Caledonia, and Papua New Guinea, is the most significant medicinal plant in the Malvaceae family. For ages, people have relied on the medicinal properties of *A. manihot* plants in various forms. The anti-inflammatory effects of the stem extract and the analgesic and antioxidant properties of the leaves extract of *A. manihot* were discovered, respectively, protecting against heart ischemia and ischemic brain damage, improving renal function, and treating diabetes mellitus are some of the medicinal properties of *A*

#### *Abutilon indicum*

A fragrant plant native to India, Bangladesh, Pakistan, and Sri Lanka, *Abutilon indicum* (L.) (*A. indicum*) is a member of the Malvaceae family. It is known as Country mallow in English and Atibala in Sanskrit. According to many studies, *A. indicum* has anti-pyretic, anti-helminthic, antiemetic, anti-microbial, anti-inflammatory, antifertility, anti-asthmatic, and anti-inflammatory activities. Wounds, ulcers, diabetes, piles, hemorrhoids, and infections of the vagina and urinary system are all treated with the extracts.

#### *Thespesia populnea*

A tree often found in tropical and coastal areas of India is *Thespesia populnea* (L.) (*T. populnea*) Soland ex. Correa, which belongs to the Malvaceae family. We call it the "Indian tulip tree" when common. According to the ancient *Ayurvedic scriptures*, *T. populnea* has medicinal qualities.

The many components of the plant have a long history of medicinal usage, including the treatment of scabies, psoriasis, worms, liver disorders, dysentery, cholera, and dysentery. For the treatment of gonorrhoea and urethritis, a mixture of bark oil and vegetable oil is utilized.

#### *Datura metel*

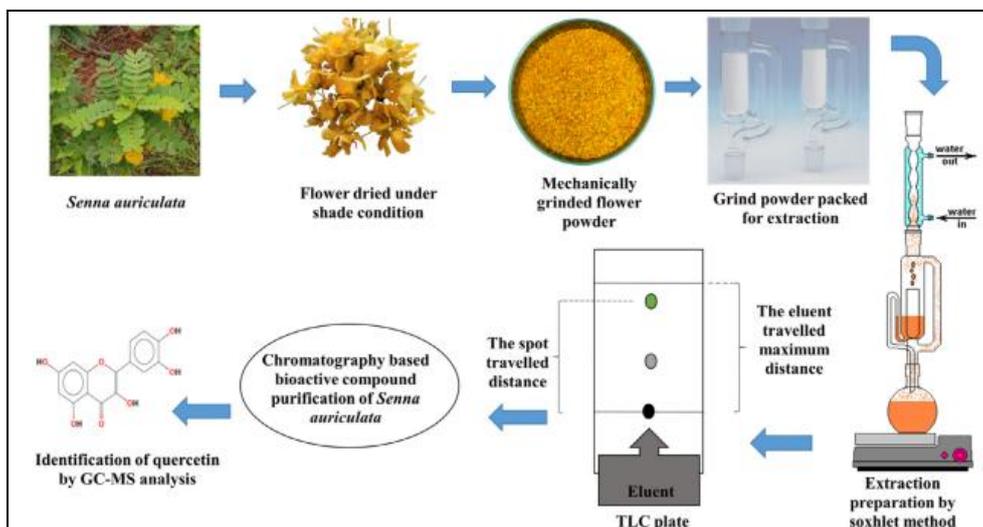
One of the most significant flowering plants in the Solanaceae family, *Datura metel* (L.) (*D. metel*) is native to tropical and subtropical areas all over the world, including India, England, Africa, and other countries. It is also used medicinally. Flower sizes range from 10 to 20 centimeters in length and 5 to 18 centimeters in width, and the plant may reach a height of 3 feet. *Datura* or *Dahatura* is a Sanskrit word that is the origin of the term *Datura metel*.

#### *Mucuna pruriens*

A tropical legume belonging to the Fabaceae family, *Mucuna pruriens* (L.) (*M. pruriens*) goes by several names: cowitch, velvet bean (English), and poonaikalli (Tamil). Crops of it are grown for human consumption, animal feed, and for use as a cover crop. The plant's seeds, leaves, and roots are all components of traditional medicinal formulas. Among *M. pruriens*' many pharmacological features are its antioxidant, aphrodisiac, anti-inflammatory, analgesic, neuroprotective, and antidiabetic effects.

#### *Senna auriculata*

The medicinal plant *Senna auriculata* (L.) Roxb., sometimes known as *Cassia auriculata*, is a member of the Fabaceae family and may reach a height of 1.2-3.0 m. The medicinal properties of this plant extend throughout its many sections. Diabetes, ocular illnesses, rheumatism, gonorrhoea, gout, urinary tract infections, worm infestation, diarrhea, pitta disease, nocturnal emissions, and pharyngitis are among conditions that the bark may alleviate. Some of the conditions that the leaves may alleviate include leprosy, ulcers, irritation of the throat, chyluria, ophthalmic issues, diarrhea, swellings, disorders of the abdomen, chronic purulent conjunctivitis of the eyes, and skin problems, the leaves and roots of *Senna auriculata* (*S. auriculata*) are used as a treatment for asthma.



**Fig 1:** A typical process of bioactive compound extraction, isolation and identification from *Senna auriculata*.

**Saussurea lappa**

The Asteraceae family counts the medicinal plant *Saussurea lappa* (*S. lappa*) among its members. It is highly regarded in Ayurveda, Chinese, Tibetan, and Unani medicine. The medicinal herb grows in various parts of Pakistan, India, and China in the higher Himalayas, at an elevation of 2600–4000 meters. *S. lappa* is listed as an endangered plant species in Appendix I of CITES (The Convention on International Trade in Endangered Species of Wild Fauna and Flora) because of its high demand in medicinal applications and overexploitation. Among the 300 species of *Saussurea*, *S. lappa* stands out as a typical perennial herb. In most cases, *S. lappa* has been used medicinally without any noticeable side effects.

**Conservation of Medicinal Plants**

The preservation of medicinal plants is becoming more important since they are being threatened by a range of environmental, social, economic, and institutional issues. Many medicinal plant species are at risk of extinction due to habitat degradation and overexploitation. Without proper protection and conservation of their wild populations, medicinal plant species may still become extinct, no matter how many botanical gardens are established or how many acres of land are devoted to cultivation. Effective and sustainable development of significant germplasm and bio-resources without harming natural habitats and ecosystems is the core objective of conservation. Sustainable conservation of valuable plant resources often involves a number of main operations, including proper identification, collection, characterization, assessment, propagation, disease removal, storage, and distribution. There is a grave risk of eradicating these invaluable biodiversity's unless immediate conservation efforts are launched.

Strategies for conservation are those that aim to ensure the long-term viability of species and other natural processes vital to human subsistence and economic activity. An interconnected research program that takes into account the interplay between socioeconomic and ecological systems is necessary for the conservation of plant resources. A diverse group of experts from different fields and organizations will need to work together on this. Assigning responsibilities to different organizations and reaching an agreement on what to do to protect biodiversity would be much easier with this. In addition, everyone involved will have an incentive to get the job done and keep tabs on how things are going.

**Concerns Related to Medicinal Plants**

Biological diversity and plant resource depletion are major challenges. In both industrialized and developing nations, a wide range of biotic and abiotic conditions pose a danger to many species of medicinal plants. Among them are:

**Over exploitation**

The pharmaceutical industry is overusing medicinal plants, and there have been little attempts to domesticate them. Since there is a scarcity of plant resources, this has a significant impact on the pharmaceutical industry, which includes Ayurvedic, Unani, and Homeopathic medication manufacturers.

**Unscientific exploitation**

Many different uses need the extraction of plants. Plant revitalization and replacement efforts are severely hindered due to a lack of research on the reproductive biology of the plant.

**Environmental degradation**

Some environmental elements that have a negative impact on plant biodiversity include natural disasters such as floods, earthquakes, cyclones, typhoons, sand dunes, and soil erosion. Intense cultivation, which is a byproduct of feeding a growing human population, and the extraction of plants for reasons other than medical ones can have negative impacts on plant biodiversity. A number of human activities, like as pollution and unregulated and unscientific grazing, pose serious risks to biodiversity and, ultimately, to the survival of many species.

**Human population**

Global warming and deforestation are two outcomes of the tremendous biotic demand on natural resources brought about by the ever-increasing human population. Some climate changes include ozone depletion, acid rain, industrial pollution, and greenhouse gas emissions. In many regions of the globe, natural flora and soil health have been negatively impacted by the overuse of pesticides and fertilizers in agricultural agriculture. Molecular biology and gene transfer have undoubtedly brought up new possibilities for food security, but critics have warned that these advancements might have a negative impact on plant biodiversity and long-term sustainability. As advocated by the World Health Organization (WHO), there is an urgent need to promote scientific research on traditional medicine and cooperation work. This study should focus on the efficacy, safety, and quality of traditional medicine.

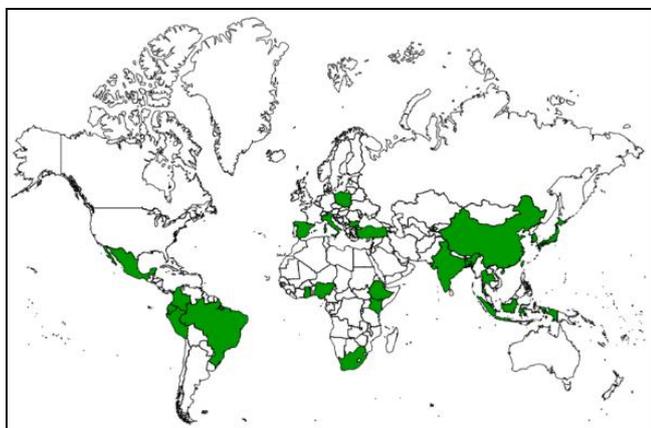
**Traditional Uses of Plants**

All living things, from people to ants to bacteria, rely on plants as their principal food supply. People have learned to employ plants for cooking and medication by trial and error, which has allowed them to progressively satisfy their requirements with what they have around them. People in human cultures have traditionally relied on anecdotal evidence on plants' beneficial benefits. Both traditional and contemporary societies are increasingly turning to medicinal plants as safe, effective, and environmentally friendly alternatives to or complements to synthetic medicines. Areas with less developed economies but the world's greatest biodiversity also tend to have the most fragrant and therapeutic plants. Communities' ability to make a living and local economies benefit greatly from the collecting and trading of these plants. The therapeutic qualities of plants have led to their broad use as reservoirs of bioactive substances. Because many human problems are treated with drugs derived from plant components, medicinal plants serve a vital role in healing most diseases.

More than 80% of the world's population uses traditional plant-based medications more often, according to the World Health Organization. The usage of medicinal plants and other types of traditional medicine was reported by 174 out

of 174 WHO member nations. A number of Asian traditional medical systems date back thousands of years. Some well-known examples are Indonesian Jamu, Chinese Traditional Medicine (TCM), Japanese Kampo, and Thai medicine. Vietnam, Malaysia, India, and Korea are among the countries that have registered and released national monographs on medications derived from plants. Bulgaria (20.2%), Spain (19.4%), Italy (8.4%), Poland (7.0%), and Turkey (10%) are the leading European growers of medicinal and aromatic plants. South Africa, with over 3,000 species, is one of the most medicinally rich countries in Africa.

The northern countries of Egypt, Morocco, and Algeria have thousands more, while the western countries of Nigeria and Ghana, the central countries of Cameroon and Gabon, and the eastern countries of Kenya and Tanzania also have large herbaria. Brazil, Chile, Guyana, Peru, Bolivia, Argentina, and Venezuela have a high biodiversity, whereas the United States and Mexico stand out in North America when it comes to medicinal plant numbers. With China and India in the forefront, Asian medicinal plants account for over half of all exports and 45% of all revenue generated by traditional medicine worldwide. With the exception of Oceania, the nations with the highest plant use are shown in Figure 2. per continent.



**Fig 2:** Countries with a greater use of medicinal plants. Own source.

### Therapeutic use of medicinal plants

The practice of using plants and plant extracts for medical purposes predates recorded human history. In many parts of the globe, people have relied on natural remedies—things derived from plants, animals, or minerals—to cure illness since ancient times. People have always looked to the plants around them for relief from pain or sickness, and they have learned about the medicinal properties of plants through years of haphazard, unfocused research, but no one knows exactly when this practice began. Approximately sixty thousand years ago, during the Paleolithic era, there was archaeological evidence of people using plants for medical purposes. More than five thousand years ago, during the Sumerian period, there was written evidence of people using plants for medicinal purposes. Some examples of ancient recorded records on the medical use of plants include papyrus, parchment, baked clay tablets, manuscript herbals, and so on.

Historical records detailing the usage of plants for medical

purposes. Traditional Chinese medicine (TCM), Ayurveda (Indian traditional medicine), and Unani (Indian traditional medicine) are only a few examples of the many ancient herbal systems that emerged from separate but related civilizations. The term "pharmacognosy" was initially used at the turn of the nineteenth century by J.A. Schmid (1759–1809) in his unpublished manuscript "Lehrbuch der Materia Medica," which was published in 1811, following his death. C.A. Seydler (1815) used the term in his book "Analectica Pharmacognostica" to refer to the scientific study of medicinal herbs. Herbalism is acknowledged as an alternative medicine used by modern medicine. Phytotherapists do not seek for specific phytochemicals; instead, they employ plant extracts (such as entire herbs, roots, leaves, or seeds) for therapeutic purposes. But now they're attempting to break down the effects of herbs into their chemical components.

### Therapeutic Potential of Medicinal Plants

Herbal remedies have a history that predates recorded history and has developed in tandem with humankind. Traditional healers throughout the globe have relied on native plants and herbs for generations to alleviate a wide range of medical conditions, and many of them have shown promising pharmacological effects. Herbal remedies have a long and storied history, beginning with their usage in tinctures, poultices, powders, and teas, progressing through formulations, and finally, as pure components. Local folklore has been passed down through many generations of families, tribes, and nations about the usage of medicinal herbs. Many valuable drugs, including analgesics (morphine), antitussives (codeine), antihypertensives (reserpine), cardiotonics (digoxin), antineoplastics (vinblastine and taxol), and antimalarials (quinine and artemisinin), have been derived from medicinal plants or their extracts. Numerous pharmacological targets, including as cancer, malaria, cardiovascular disease, and neurological disorders, are being addressed via the ongoing process of medicinal plant drug development.

The discovery of bioactive natural compounds from plants has been a game-changer. Through millions of years of evolution and adaptation, they have developed the ability to synthesize structurally varied secondary metabolites that are resistant to weather, insects, fungus, bacteria, and other microbes. These plants were used as a main source of medications for early drug development due to their ethnopharmacological qualities. The majority of plant-derived pharmaceuticals still have their original ethnopharmacological use, and 80% of people still use traditional medicines derived from plants for primary health care, according to the World Health Organization (WHO) natural products have a long history of use in folk medicine and traditional medicine for the treatment of various diseases and ailments. The majority of pharmaceutical active components have originated from these plants. When discussing drug development in the "olden days" prior to postgenomic technology and high-throughput screening, this is generally believed to have been correct.

### Conclusion

Numerous bioactive compounds found in medicinal plants are used to treat and cure a wide range of ailments.

Medicinal herbs have long been an important part of the fight against deadly diseases like hepatitis and cancer, among many others. Around the world, herbal remedies are growing in popularity. The numerous medicines that have changed people's lives over the past 50 years have mostly come from plants. The World Health Organization (WHO) supports and promotes the integration of herbal medicines into national healthcare systems because to its historically dependable methods, low cost to the average individual, and notable safety when compared to synthetic modern pharmaceuticals. Medicinal plants are used to make Ayurvedic medicines, but the supply and demand for these plants in India are drastically out of balance. Over the last fifteen years, the US has seen a surge in the use of natural medicines due to a mix of public dissatisfaction with the side effects and high expense of allopathic medicine as well as a desire to return to more organic and natural treatment techniques. Plants and plant extracts have been used for medicinal reasons for as long as documented human history. Since ancient times, humans have used natural remedies-items made from plants, animals, or minerals-to treat illnesses in various regions of the world.

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