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A Study on Medicinal Plant and Their Application as Antimicrobial Agents

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ABSTRACT: Various medicinal plants have already demonstrated their efficacy in treating diseases such as bacterial infections and life-threatening diseases. Antioxidant-rich medicinal plants have shown to be the most effective antimicrobial agents. As a result, the current review concentrates on a few selected medicinal plants as well as their antimicrobial properties.

Keywords:*Medicinal plant, Antimicrobial Agents, Applications*

1. INTRODUCTION:

A host of illnesses, including hypertension, gastrointestinal complications, skin conditions, respiratory and urinary conditions, as well as hepatic and cardiovascular illness, have traditionally been treated with medicinal plants (Tian et al., 2014; Van Wyk and Wink, 2004). These plants produce a number of biologically active compounds that aid in their growth and survival in the wild, including defenses against abiotic stresses such as water scarcity, temperature, insect pests and mineral nutrient supply, (Cushnie et al., 2014; Bajguz, 2007; Treutter, 2006; Simmonds, 2003; Vardhini and Anjum, 2015). Plant forms, surface environments, and microbe interactions all affect the biologically active compounds in medicinal plants (Morsy, 2014; Zhao et al., 2011).

Plants have been used to treat diseases since the beginning of time. Popular perceptions of medicinal plant use and efficacy play a significant role in the disclosure of their therapeutic properties, resulting in their widespread prescription, even if their chemical constituents are not always fully understood. Medicinal plant usage has aided primary health care in many countries around the world, especially in South America (Maciel et al., 2002). There are between 250 and 500 thousand plant species on the earth, but just 1 to 10% are eaten by humans and other creatures (Cowan 1999). Brazil has the world's largest biodiversity, with more than 20% of all recognized organisms found there. This nation having the world's most abundant flora, in accordance for 22% of the total with over 55 thousand identified species. As a consequence of such biodiversity, the usage of medicinal plants is universally recognized (Carvalho et al., 2007). Just 37% of commonly available medications are consumed by the majority of Brazilians (80%), who rely almost exclusively on natural medicines (Funari, et al., 2005). Since the specific criteria for utilizing medicinal plants do not provide stringent quality control for protection and effectiveness, phytotherapics hit the industry offering a simpler and cheaper manufacturing route than other forms of medicines (Niero et al., 2010).

Antibiotics play in crucial role developing the global burden of infectious diseases (Bhatia and Narain, 2010). A significant public health problem has arisen as a result of the spread and development of multidrug-resistant (MDR) pathogenic microorganisms, if any, antimicrobial

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agents are effective for infections induced by pathogenic bacteria (Boucher, et al., 2009; Giamarellou, 2010).

As a consequence, discovering novel antimicrobial medicines is essential in the face of evidence of the fast worldwide expansion of resistance treatment isolates. In addition, given the history of fast and widespread resistance to newly introduced antimicrobial drugs, current antibiotic families are expected to be short-lived (Coates, et al., 2002).

Plant extracts and photochemicals, all of which have antimicrobial effects, may be used to cure bacterial infections. In recent years, a host of experiments in different countries have been performed to show such efficacy. Because of their antimicrobial properties, many plants have been used.

We attempted to investigate traditional plants and their use as antimicrobial agents in this study.

2. REVIEW OF LITERATURE

Manandhar, S., 2019- Antibiotic tolerance and the emergence of new types of disease-causing bacteria are still generating worry in the global health community. In the future, effective disease therapy will require the use of new medications or a continuous supply of experimental therapies. Our culture has long relied on medicinal plants as a source of cures for a wide range of ailments, including this one. Plants often used in traditional medicine are being studied to see whether their antibacterial properties can be uncovered. Sixteen pathogenic microorganisms and two reference bacterial strains were tested with four different plant extracts for antibacterial activity. Oxalis corniculata, Artemisia vulgaris, Cinnamomum tamala, and Ageratina adenophora methanolic extracts were tested for antibacterial activity using the agar well difusion method. According to the findings, the majority of the extracts have antibacterial properties. In vitro, the extract of O. corniculata was the most effective against Escherichia coli, Salmonella Typhi, MDR Salmonella Typhi, Klebsiella pneumoniae, and Citrobacter koseri, with ZOIs of 17, 13, 16, 16, 11, and 12 millimeters. Oxalis corniculata had the highest MIC of all of the tested microorganisms, and this was not surprising. These plants, as well as others like Artemisia vulgaris and the cinnamon tamala, were shown to have antibacterial properties when tested in methanolic extracts against Staphylococcus aureus. Ageratina adenophora's antifungal activities are also resistant against Rhizopus spp. Certain plant extracts were shown to be effective as natural antimicrobials and may be utilized in medications to treat infectious illnesses caused by the species studied.

Egamberdieva, et al., (2017) - Because of their bioactive chemicals, medicinal plants are thought to harbor endophytic microbes. Uzbekistan's Chatkal Biosphere Reserve's Hypericum perforatum and Ziziphora capitata medicinal plants yielded endophytic bacteria with opposing antimicrobial activities, which were then examined in a partial sample as part of an ongoing research. Extracts of the H. perforatum plant were shown to be efficacious against bacterial and fungal infections, but not against Z. capitata. Z. capitata. Using MALDI time-of-flight mass spectrometry, plant-associated culturable endophytic bacteria are categorized (MS). H. perforatum-associated culturable endophytes belong to eight different taxa (Achromobacter, Arthrobacter, Bacillus, Erwinia, Pseudomonas, Enterobacter, Serratia, Pantoea, and Stenotrophomonas). Except for Arthrobacter, Serratia, and Stenotrophomonas, the endophytic isolates from Z. capitata are from the genera Arthrobacter, Serratia, and Stenotrophomonas. In

comparison to Z. capitata, H. perforatum had greater antibacterial activity and therefore helped more microorganisms that were hostile. Under greenhouse conditions, antagonistic isolates had control over the environment. Tomato root rot was induced by Fusarium oxysporum, which aided plant growth and may be a low-cost source of biological control agents for agriculture.

3. MEDICINAL PLANTS

Plants have been a significant source of therapeutic substances for the preservation of human wellbeing since ancient times. Herbal extracts or active components are utilized as folk medicine in traditional treatments, according to the WHO, and natural compounds account for 80% of all medicines sold worldwide (Kirbag et al., 2009).

Many phytochemicals have uncertain roles, however a significant number of experiments have shown that they play a role in plant-pest-disease interactions. Plant extracts and phytochemicals are screened for antimicrobial activity as a starting point for antimicrobial drug development. As a result of the emergence of modern and advanced methods, plant scientists have been involved in phytochemical studies. These methods became critical in the pharmaceutical industry's quest for additional raw material supplies (Lokesh, et al., 2010).

Antibacterial behavior is a product of medicinal plants' immunomodulatory and antioxidant effects. They have a number of immunomodulatory properties that stimulate both non-specific and specific immunity. Plant extracts and phytochemicals, all of which have antimicrobial effects, may be very beneficial in medicinal therapies. In recent years, a host of experiments in different countries have been performed to show such efficacy. Many plants have been utilized for their antibacterial properties, which are due to chemicals produced during the plant's secondary metabolism (Mahon and Manuselis,1995).

In Palestine, medicinal plants that may be used to cure a range of illnesses have been identified. Herbal medicine is a big part of Palestinian culture, and it's utilized a lot in contemporary public health care. There are over 2600 plant varieties in Palestine's hills and valleys, with over 700 of them being used as medicinal plants or botanical pesticides (Mackie and McCartney, 1989).

4. ANTIMICROBIAL AGENT

An antimicrobial agent, also known as antimicrobial medicine, is a substance that can kill or slow the growth of microorganisms. Antimicrobial medicines are classified according to the microorganisms they attack, such as bacteria and viruses (Burnett-Boothroyd, 2011). Based on the chemical compounds they produce, antimicrobial agents are divided into two classes. Antibiotic products, as well as gold and metal oxide nanoparticles such as silver and silver oxide, are forms of synthetic antimicrobial agents (chemical antimicrobial agents). The second category comprises of herbal antimicrobial agents.

Because of possible hazardous or detrimental impact of many chemical antimicrobial medicines, natural materials have lately become suitable for treating microbial diseases. Chemical antimicrobial agents' antimicrobial mechanisms against herbal antimicrobial agents are depicted in Figure 4. Herbal materials may be an excellent alternative, as well as a novel approach to developing new anticancer, antibacterial, and antiviral medicines with fewer side effects. This substance has been proven to be a potential antibacterial agent in many investigations. This study article discusses a variety of medicinal herbs, including portulaca, clove, eryngium, tribulus,

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turmeric, cinnamon, thyme, ginger, mint, pennyroyal, chamomile, fennel, eucalyptus, burdock, lemon balm, primrose, garlic, and mallows.

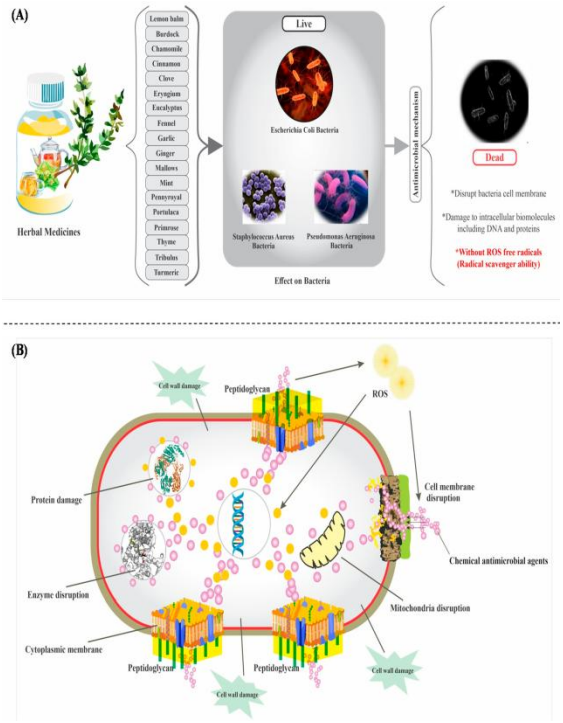

Figure1: Herbal antimicrobial agents' antimicrobial mechanisms (A) against chemical antimicrobial agents (B)(Najafloo, R. et al., 2020; Nithya, P.; et al., 2020)

5. MEDICINAL PLANTS: ANTIMICROBIAL PROPERTIES

Plants contain a wide variety of bioactive molecules, rendering them a valuable source of various medicines. The overwhelming majority of modern medicines are pure or semi-synthetic versions of natural goods used in conventional medicinal schemes. As a consequence, screening traditional natural ingredients for drug production is a practical approach. The bulk of new antibiotics on the market are produced from natural or semi-synthetic products, and only 20% of all plants on the globe have been exposed to medicinal or biological research (Sukanya et al., 2009; Mothana and Lindequist, 2005).

For thousands of years, ancient Egyptians, Indians, Africans, and Asians have used plants as popular remedies. While some ancient remedies were only passed down by word of mouth through the centuries, Several herbal texts have been produced that explain how plants were treated and utilized in ancient medicine. Plants were listed as the primary component in traditional medicines in an added ancient writing from Greek doctors (100 AD), and Chinese scientists (100 BC) and another ancient script from Egypt identified plants as the key ingredient in traditional remedies (2600 BC). Until they were swallowed or applied topically, plant components employed as medicines were only impure rudimentary extracts in the form of semi-

solid, powder, or oil, and they were only produced with basic galenical preparations to create impure rudimentary extracts in the form of powder, semi-solid, or oil, (Rates, 2001).

Medicinal plants are also being used in pharmaceuticals, cosmetics, and neutraceuticals. Medicinal plants have been used to combat chronic and contagious diseases and are widely used in the pharmaceutical industry owing to the large range of compounds present in plants. Years before mankind discovered microbes, it was well accepted that some plants had medicinal properties and contained what we now refer to as antimicrobial principles. Plants have been used to cure infectious diseases since antiquity, and some of these ancient remedies are now commonly used to treat a range of ailments (Okigbo et al., 2009; Rios and Recio 2005).

Medicinal plants, according to the World Health Organisation (WHO), are the safest supplier of a broad spectrum of medicines. Many ethnic groups utilize a variety of plant species to cure a variety of illnesses, including mild cancers, skin disorders, dysentery, malaria, asthma, and a slew of other conditions. More study into plant-based antimicrobials is desperately required since they provide a significant untapped source of medicines. Plant-derived antimicrobials have immense therapeutic ability. Antimicrobials obtained from plants have a long tradition of delivering much-needed innovative therapeutics (Silva et al., 2012). Plants are continually interacting with external environmental conditions that are increasingly evolving and possibly harmful. Plants have developed elaborate alternate defensive mechanisms as a result of their lack of mobility that employ a large number of chemical metabolites as a way of combating stress.

Following the discovery of morphine in 1804 came the search for valuable opioid molecules in plants. Since then, tens of thousands of modern systems have been discovered. Despite all of the money spent on research and development, there are still just a few hundred authorized plant-based medications on the market. Due to the bad +pharmacological/toxicological profiles of some plants, this is a factor (Harvey, 2008). For the time being, there are no scientifically proven methods for finding plants that produce new, biologically active compounds. Plant-based addiction development providers must use "nonscientific" methods to save time and money on these operations. Phytochemical sampling, followed by bioassays and pharmacological screens, has been used by scientists working on natural product medicine development. The finest and last choice is a collection centered on "folklore" use. A wide range of drugs derived from higher plants have caught the attention of pharmaceutical researchers due to their use in herbal medicine (Marderosian & Liberti, 1988).

Drug discovery trials in the last decade have centered on active compounds present in widely used medicinal plants. As a result and demand for natural product analysis, a variety of sophisticated methods, especially in separation, spectroscopic, and bioassay techniques, are now accessible. For example, using LC-MS, GC-MS, LC-NMR, LC-FTIR, CE-MS, and LC-NMR-MS, Crude extracts or fractions from various natural sources can now be studied prior to isolation. As a consequence of the dependence on earlier methodologies, new approaches focused on easy extraction and elucidation, as well as novel bioassay screening methods for bioactive chemicals, have been created (Sarker, Latif & Gray, 2006).

Plants' capacity to conduct combinatorial chemistry by mixing, matching, and producing gene products necessary for secondary metabolite biosynthesis results in an endless pool of chemical compounds that humans have exploited. This theory is exemplified by humans' usage of plants in both conventional and contemporary medical schemes (Ncube, et al., 2012).

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6. Plants with antimicrobial activity

6.1 Alangium salvifolium (Alangiaceae)

Alangium salvifolium Wang is a member of the Alangiaceae family. Ankolam is the local name for it. The Alangiaceae is a tropical and subtropical monogeneric family of trees and shrubs. There are approximately twenty-one species of *Alangium*, which are divided into four classes. *Alangium, Conostigma,Marlea,* and *Rhytidendra* receive good health care and therefore need a lot of resources. 19 Only Karaangolam is one of two distinct variants of this medicine, the other being *Angolam*, which is commonly utilize against many infectious diseases. They are *Alangium salvifolium* subspecies *salvifolium*, and *Alangium salvifolium*, *hexapetalum*, respectively. In India, Africa, Sri Lanka, Indochina, and China, the plant grows in dry areas, deserts, and lower hills. Core is used to treat diarrhea, clusters, paralysis, and vomiting. They have emollient, astringent, thermogenic, anthelmintic, purgative and diuretic, characteristics, to name a couple. Externally, the root can be used to treat rheumatism, leprosy, and inflammation, and internally, it can be used to treat rabbit and dog bites. The flower of *Alangium salvifolium* yielded an antibacterial agent. Several flavanoids, phenolic compounds, irridoid glycosides, and oxyoglucoside have been isolated from this plant in recent phytochemical tests. In an animal model, the analgesic and anti-inflammatory effects of a methanolic extract of the root have been explored. Compounds were derived from chloroform extract from the plant's aerial component using chromatographic techniques. Ankorine, a novel alkaloid, was discovered in trees (Naik, 1986).

6.2 Abutilon indicum (Malvaceae)

Abutilon indicum widely used as a medical plant.. This plant is a small shrub native to the tropics and subtropics that is seldom used as a decorative plant, despite the fact that it is invasive on several tropical islands. Khangi, Jhampi (Bangladesh), Atibala (India), Petari, Dong kui zi, Abutilon Atibala (US), Mi lan cao (China), and Guimauve (France) are all names for Abutilon indicum (Guadaloupe). It has developed itself in countries such as India, Bangladesh, Sri Lanka, and Pakistan, among others. 7 This plant has astringent, antibacterial, anthelmintic, carminative, and diuretic effects. Colds, high fevers, measles, bronchitis, asthma, arbuncles, hemorrhoids, hernias, diarrhea, and a variety of worm infections are all treated on the premises Aphrodisiac, demulcent, diuretic, laxative, sedative, and pulmonary aphrodisiac Aphrodisiac, demulcent, diuretic, laxative, sedative, and pulmonary aphrodisiac Aphrodisiac, demulcent, diuretic, laxative (leaves). The herb is a laxative, tonic, anti-inflammatory, and anthelmintic, while the seeds are a laxative, expectorant, and demulcent. The bark is astringent and diuretic, and the fixed oil is a diuretic (roots). Nishanta has been uprooted, crushed, and powdered fully. Women were instructed to take a spoonful of this powder with a tablespoon of honey every day for six months before their wedding day to ensure a healthy and quick birth.

6.3 *Achyranthes aspera(Amaranthaceae)*

The *Amaranthaceae* family contains the herb *Achyranthes aspera* (also known as Prickly Chaff Vine, Devil's Horsewhip, or Apamarga in Sanskrit). It can be found in tropical areas all over the world. It thrives as both an introduced plant and a native weed in a broad number of ecosystems. It is a perennial, rigid, erect herb that develops as a weed in India. It's an essential medicinal plant that may assist with odontalgia, rheumatism, bronchitis, skin disorder, and rabies, among

other ailments. In certain places, such as some Pacific Island habitats, it is an endangered species. A variety of medicinal uses for the plant are practiced in Uttar Pradesh, particularly in the fields of obstetrics and gynecology, such as abortion, labor induction, and the reduction of postpartum bleeding. The Maasai people of Kenya utilize this herb to treat malaria symptoms when they get them. Achyranthes aspera's aglycones include triterpenoid saponins and oleanolic acid. Ecdysterone, an insect moulting hormone, and long chain alcohols are both found in Achyranthes aspera. Mice and rabbits exposed to the plant go into early labor and have healthy babies. Because of its estrogenicity, an n-butanol extract has been shown to have reproductive potency in rats. Against staphylococcus aureus, streptococcus heamolyticus, and germs like Bacillus typhosus, the Achyranthes aspera Linn entire plant and an aqueous solution of its base have antibacterial properties. The alcoholic and aqueous leaf samples both showed antibacterial activity against Staphylococcus aureus and E. coli. Thyroid stimulating and antioxidative properties have been shown for leaf extracts. Aqueous and methyl alcohol extracts from the plant lowered blood glucose levels in both normal and alloxan diabetic rabbits. *Alkaloids*, *flavonoids*, *saponins*, *hormones*, and *terpenoids* are all said to be present. Flavonoids are biological reaction regulators with a range of nutritional roles; the bulk functions as antioxidants, whereas some have anti-inflammatory properties. Some tumors have been found to be prevented or slowed by flavonoids. Saponins have been considered to have a lot of biological activity for a long time. Saponins attach to cholesterol and thus prevent cell division and development. Saponins, unlike medications, have no adverse effects, all of which are severe. *Achyranthine* is a water-soluble alkaloid present in *Achyranthes aspera* that has anti-inflammatory effects (Gokhale , et al., 2002).

6.4 Allium sativum (Liliaceae)

Garlic (*Allium sativum*) is a member of the *Allium sativum* family of plants. In vitro studies have revealed that garlic possesses antibacterial, antiviral, and antifungal properties. These actions, on the other hand, are less visible in real life. Garlic has also been linked to a reduced risk of cancer and heart failure. Cancers of the stomach and colon may be treated with garlic. Actually, nations with a traditional diet heavy on garlic have reduced cancer rates to show for it. Animal studies and some early human results also suggest that garlic may have cardiovascular effects. A Czech research found that supplementing animals' diets with garlic decreased the buildup of cholesterol on their arterial walls. In a different research, garlic intake in cholesterol-fed rabbits decreased aortic plaque formation. Adding garlic extract to the diet of high-cholesterol individuals lowered their risk of vascular calcification, according to another research. In red blood cells (RBCs), a process based on reduced thiols in or on the RBC membrane is believed to be the cause of garlic's well-documented vasodilatory impact. H2S is an inherently cardioprotective natural chemical, acting as a signaling molecule in arterial cells. NIH-sponsored research published in the Archives of Internal Medicine in 2007 found that garlic consumption had no effect on blood cholesterol levels in individuals with relatively high baseline cholesterol. "After decades of research showing that garlic can raise cholesterol profiles, a new NIH-funded analysis found that raw garlic or garlic extracts had no effect on LDL, HDL, or triglycerides," according to the Heart.org website. The results highlight the dangers of meta-analyses based on minimal, faulty samples, as well as the importance of thoroughly researching traditional herbal remedies ". Two physicians from Cornell University's Weill Cornell Medical College wrote in an editorial about the original report's results that it may be there an "impact of garlic on atherosclerosis directly those were not picked up in the research." Platelet aggregation and hyperlipidemia have been

shown to be minimized by *Allium sativum*. According to the BBC Other effects of *Allium sativum* include the prevention and cure of the common cold. Garlic has long been used in herbal medicine to treat hoarseness and coughs, proving this argument. The usage of medicinal doses of aged garlic extract on a regular and long-term basis has been shown to reduce serum homocysteine levels and avoid certain diabetes complications. Garlic cannot be eaten in medicinal doses after consulting a practitioner. Garlic's antibacterial effects were discovered by Louis Pasteur in 1858. Despite the fact that the bulk of the patients complained of a poor taste and halitosis, a mouthwash containing 2.5 percent fresh garlic was shown to have high antimicrobial potency in a recent clinical trial. Garlic cloves may be used to cure infections (especially chest infections), stomach problems, and fungal diseases such as thrush. Garlic may be used as a disinfectant because of its bacteriostatic and bacteriocidal properties. Garlic has been proven to improve thiamin absorption, reducing the risk of beriberi (thiamin insufficiency). It's an excellent source of energy due to its high vitamin C concentration. In 1924, it was found to be an effective method to prevent scurvy. An uncontrolled sample of AIDS patients in China found that garlic was somewhat effective in treating Cryptosporidium infection. Toxoplasmosis is an illness caused by a protozoal parasite that has been utilized to treat an AIDS patient. Studies have shown that giving rats a high-protein diet and then supplementing with garlic increased their testosterone levels. In a double-blind, parallel, randomised, placebo-controlled trial conducted in 2010, aged garlic extract outperformed a placebo in lowering systolic blood pressure in patients with controlled but untreated hypertension, according to the results of 50 patients' daily health histories in general practice (Zampini IC, et al., 2009).

6.5 Carum carvi (Apiaceae)

Carum carvi, called as Persian cumin, or meridian fennel is a biennial herb native to Europe, Western Northern Africa and Asia, in the *Apiaceae family*. Basic oils, mostly carvone and limonene, give the fruits a pungent, anise-like flavor and scent, and they are traditionally used whole. They're used in breads, particularly rye bread, as a spice. Mouthwashes, liqueurs, soaps, toothpastes, and perfumes will all benefit from *C. carvi* essential oil.Carminative, antispasmodic, and appetite stimulant, *C. carvi* is used (Farag , et al., 1989).

According to our findings, the above oils have bactericide action against plant pathogenic bacteria, including those that cause disease in cultivated mushrooms. The usage of simple oils or their constituents as bactericides in the treatment of plant bacterial diseases is a promising prospect. It's also interesting to consider the potential of utilizing these chemicals as seed treatments to fight phytopathogenic bacteria and therefore limit long-distance transmission. Because basic oils have strong antibacterial properties, they can be used to treat bacterial infections in mushrooms. More research is needed to determine the toxicity of essential oils extracted from seeds, herbs, and mushrooms.

6.6 Emblica officinalis (Phyllanthaceae)

In Indian medicine, *amla (Emblica officinalis),* also known as *Emblica officinalis,* is a well-respected weed. Unani medicine uses the dried amla fruits to treat bleeding, diarrhea, and dysentery. Experimental evidence suggests antiviral and antibacterial properties in vitro. It has the potential to be cautious when treating cancers like these. *E.* with *ficinalis* treatment lowered the occurrence of acute pancreatitis in a recent animal study. It also aided the pancreas' natural healing and regeneration process after a severe assault. Experiments with trees, bark, and fruit

have shown that they can be useful in the field against disease models. Just a few examples include cancer, inflammation, diabetes, and age-related renal failure. According to a human pilot study, therapy reduced cholesterol levels in both healthy and hypercholesterolemic men. I Researchers found that an aqueous amla fruit extract significantly reduced blood glucose and triglyceridemic levels in diabetic rats caused by alloxan while also improving liver function. A decrease in the function of the alanine transaminase enzyme in the liver was blamed for this. The exact quantity of vitamin C (ascorbic acid) supplied by these fruits is unclear, although amla's high tannin density may explain its overall antioxidant power. Flavonoids, kaempferol, ellagic acid, and gallic acid are some of the other polyphenols found in the fruit (Coe , Anderson , 1996).

6.7 Glycyrrhiza glabra (Fabaceae)

Orthodox Indian medicine considers it to be highly valuable. Haemorrhage, diarrhoea, and dysentery are treated with the dried fruits of amla in Unani medicine. It has undergone preliminary testing, with antiviral and antimicrobial properties shown in vitro. It may have anti-cancer properties. Giving E. of ficinalis to animals reduced the occurrence of acute pancreatitis and helped the pancreas' normal regeneration and rehabilitation after a serious attack, according to new findings. Experimental formulations of leaves, bark, or fruit have showed promise in lab models for treating inflammation, cancer, age-related kidney disease, and diabetes. In a human pilot study, blood cholesterol levels in both ordinary and hypercholesterolemic males were reduced after treatment. According to another recent analysis using alloxan-induced diabetic rats, normalizing the liver-specific enzyme alanine transaminase activity resulted in a significant reduction in blood glucose and triglyceridemic levels, as well as an increase in liver function. The exact amount of vitamin C (ascorbic acid) provided by these fruits, 445 mg/100g, is unknown, and the overall antioxidant intensity of amla could be due to its strong tannin content. Flavonoids, kaempferol, ellagic acid, and gallic acid are among the fruit's other polyphenols (Coe , Anderson , 1996).

6.8 Mimosa pudica (Mimosaceae)

Mimosa pudica(also known as fragile plant or touch-me-not) folds inward and droops when approached or shook, (Latin:pudica "shy, bashful, or The fascinating annual or perennial herb shrinks and then reopens after a few moments. South and Central America are the natural habitats of this plant. Although it can also be found elsewhere in the world. It has right spread across the world. The poisonous alkaloid mimosine is produced by Mimosa pudica, and it has been shown to suppress cell proliferation and cause apoptosis. Mimosa pudica extracts immobilize Strongyloides stercoralis filariform larvae in less than an hour. Mucilage can be contained in the stems, and tannins can be found at the root. Antihyperglycemic, anti-diarrheal, anti-convulsant, and cytotoxic properties are all found in Mimosa pudica. The lethality of the monocled cobra's poison has been shown to be neutralized by aqueous tests of the plant's roots (Naja Kaouthia). Cobra venom's myotoxicity and enzyme activation tend to be inhibited by it. Turgorins are also found in the vine, and its leaves and roots are used to treat piles and fistulas. Hydrocele is treated with a leaf paste. Sinus dressings are made of cotton impregnated with leaf juice. The plant may also be used to heal swollen gums and as a blood purifier. The current research was carried out to determine the antibacterial function of the herb and to back up its use in folk medicine to treat a variety of ailments.

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6.9 Sida cordifolia (Malvaceae)

The perennial Malvaceae subshrub Sida cordifolia (country mallow, bala, or heart-leaf, flannel weed or sida) is native to India. In Australia, Africa, the southern US, the Hawaiian Colonies, French Polynesia and New Guinea, , it is an invasive herb. Cordifolia is the scientific term for the heart-shaped herb. S. cordifolia, also known as "malva branca" in Ayurvedic medicine, is a herb used to treat blenorrhea, oral mucosa irritation, nasal pain, and asthmatic bronchitis stomatits, asthma, and nasal irritation, as well as a number of illnesses in many parts of Africa, especially respiratory disorders. It's been tried as an anti-inflammatory, a cancer treatment, and a way to help the liver regenerate. The psychostimulant effects of ephedrine influence both the central nervous system and the heart. In rats, a 50 percent ethanolic extract of Sida cordifolia had the same antioxidant and antiinflammatory potency as the standard medication deprenyl. Anti-pyretic and anti-ulcerogenic effects have been discovered in the berries. In rodents, aqueous extract of Sida cordifolia facilitates liver regeneration. 92 The plant contains no tannins or glycosides that have been established. Ephedrine is an alkaloid occurring in the roots and stems of gymnosperms belonging to the genus Ephedra, which includes a wide range of gymnosperm plants. Ephedrine and pseudoephedrine are the most common alkaloids in the plant's aerial components.Sterculic, malvalic, and coronaric acids, as well as other fatty acids, have been produced from seed oil.

6.10 Tinospora cordifolia (Menispermaceae)

Tinospora cordifolia, commonly known as Guduchi, is a Menispermaceae herbaceous vine native to India, Myanmar, and Sri Lanka's tropical areas. The plant develops as a glabrous climbing shrub in deciduous and dry forests in India. The leaves have a heart design on them. The creamy-white to gray-colored succulent bark has deep clefts interwoven with lenticels. It grows on mango and neem trees and has long, thin aerial roots. 95 It's a well-known medicinal plant in India, and it's been used in Ayurvedic medicine for decades to treat a variety of ailments. This medication is used to treat a wide range of ailments including gout, gonorrhoea, and leucorrhoea, along with general ill health and illnesses such as diabetes, hypertension, jaundice, skin disorders, rheumatism, and gonorrhoea. An infusion of the stem may be used as a vermifuge and to treat fever, cholera, diabetes, rheumatism, and snake bites. For sore eyes and syphilitic sores, use a decoction of stems. According to the Thailand Pharmacopoeia, the stem may be found in several Thai hospitals where patients with diabetes are treated. The decoction of the stems is used to treat skin ulcers and has antipyretic and antimalarial effects. Treatments for Malaria Fever, Jaundice, and Intestinal Worms Included an Infusion in the Past. Leaf extracts from the plant are used topically to treat gonorrhoea, and they're said to alleviate burning and discomfort. To prevent unwanted births and keep tabs on population development, use methanolic stem extract of Tinospora cordifolia, which has antifertility properties. In cases of bilious dyspepsia and fevers exacerbated by other bitters and aromatics, a root infusion with ginger and sugar is suggested. Soak roots in water with bonduc nuts to relieve stomachaches, especially in children under the age of 18. Indigestion and jaundice are also well-served by them. The infusion will also be used to treat smallpox and cholera fevers. This infusion is most often used in conjunction with other medications to treat dyspepsia. To treat ulcers, the leaves are crushed and mixed with honey before being administered topically. In order to treat wounds as well as anthrax, diarrhea, asthma, and cough, the whole plant is utilized including the stem and the base. The root of this plant is well-known for its anti-malarial, anti-stress, and anti-

leprotic qualities. Tinospora cordifolia stems are used in Ayurvedic remedies for debility, dyspepsia, fever, and urinary disorders (Lans, 1996).

6.11 Woodfordia fruticosa (Lythraceae)

Woodfordia fruticosa Kurz's dried flowers have also been used like astringent tonic to combat haemorrhoids, mucous membrane infections, and liver problems. Colour of the flower is bright red and its bark is thought to be the source of the Sanskrit term Tamra-puspi or Agnijwala. In India's Ayurvedic and Unani medicine systems, it is a widely used medicinal herb. In India and Nepal, as a folk remedy *Woodfordia fruticosa* leaves are used. A decoction of Dawai (the local term for this plant) leaves, dried ginger and sugar, is suggested in the fever event. *Woodfordia fruticosa Kurz* flower extracts included carbohydrates, gums, flavonoids, sterols, and compounds/tannins (Essawi , Srour , 2000).

6. CONCLUSION

Almost all plants have medicinal properties; the aim of this article was to look at a few Indian medicinal plants. The study of medicinal plants and their use as antimicrobial agents clearly demonstrates that it s vet much uses of medicinal plant and it is also found essential role in diseases treatment and infections treatment.

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