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A STUDY OF ANTIBACTERIAL EFFICACY ON CHOSEN MEDICINAL HERBS

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ABSTRACT

Medicinal herbs have been used by humans since prehistoric times. Plants have been considered to have curative qualities as least as far back as Neanderthal man. Evidence of its usage dates back to ancient Babylonia, around 1770 BC. Ancient Egyptians and those who followed Hammurabi's law both considered therapeutic herbs to have value beyond life and death. The Cairo Museum's Access Excellence Resource Centre has a display case full of Giza pyramid-era plant specimens.The study of plants, or botany, is where ethnobotany got its start. In turn, the search for medicinal plants was a primary inspiration for the development of botany. In reality, there has always been a strong relationship between botany and medicine. Drugs used today, for example, often start off as extracts from plants. Pharmocognosy refers to the research of plant-based medicines and natural toxins. Yet, as science and medicine progressed, natural medications were gradually supplanted by synthetic ones. Most pharmaceuticals used in developed nations come from plant sources. Certain drugs were still developed with plant materials as their starting point, but laboratory research became the primary focus.

KEYWORDS: Antibacterial Efficacy, Medicinal Herbs, medicine, Drugs

INTRODUCTION

In a time of great environmental stress, ethno-botanists can get valuable insight into the conservation of tropical forest reserves through the use of a multidisciplinary approach, such as ethnobotany. As a result of human interference with the delicate natural balance of these ecosystems, we now face the prospect of losing our forests.

Humans are the most successful and powerful organism on Earth because of their capacity to use the planet's natural resources for their own benefit. Ingenuity and technological advancement made it possible for humans to create a material civilisation and a distinct home for him. Several human societies established regular patterns of settlement in the form of hamlets, villages, and eventually cities. Nonetheless, the vast majority of human populations around the globe, especially in third world nations, continue to live in and around the forest, where their way of life and customs have not changed in generations. Forest-dwelling tribes, and other similarly underdeveloped societies, are sometimes hailed as "living archaeological museums" of old customs and cultural history that enrich and enliven the human race.

As Walter Hough put it in 1898, ethnobotany is the "study of plants in their connection to human civilization" (Ford; 1978), which includes the psychological significance and mythological reference of plants. The discovery of the Barrows in 1900 sparked interest in the cultural and spiritual value of plants. The University of Chicago awarded him the first PhD in ethnobotany.

"The ancient Hindus should be given the credit of producing what is now called ethnobotany," said Kirtikar and Basu (1933), the first Indian authors to adopt the word ethnobotany.

Several plants' healing powers were recorded in the Vedic period's Rigveda. Ethnobotany, as defined by Schulters (1941), is the study of how people interact with the plants in their natural environments. According to Jones (1941), the field of ethnobotany studies the connections between prehistoric humans and plants.

Alcorn (1984) offers a more up-to-date definition of ethnobotany as the "science of direct interation between humans and plants," which is focused on the plants' whole cultural significance. Research into ethnobotany may now encompass a broader range of topics according to this definition. The book Glimpses of Indian Ethnobotany was published to help advance the field of ethnobotany in India (Jain, 1981). This book broke new ground by providing an overview of the state of ethnobotany research in modern India.

Botanists, anthropologists, phytochemists, pharmacologists, foresters, archaeologists, folklorists, vaidyas, etc., are only few of the disciplines that have recently taken an interest in ethnobotany.

The expanding field of study is primarily motivated by the necessity of meeting the demands of the agricultural and pharmaceutical sectors. Traditional healers and plant specialists in native communities provided crucial evidence for determining which plants had the potential to be cultivated for their use in food and medicine. This ancient wisdom may have been the basis for modern medicine. During the past three decades, there has been a surge of interest in ethnobotany research, particularly in developing and industrialized nations with populations who rely on traditional medicines gleaned from the forest interiors.

Traditional healers and plant specialists within a community frequently play a pivotal role in demonstrating which plants have the potential to be cultivated for use as a food or medicinal source. Studies like this are quite informative and helpful in learning more about native flora. Recognizing medicinal plants is a field that is seeing a gradual drop in research. When traditional cultures die out, much of this treasure of information is being lost forever (Hamilton, 1995). Thus, contemporary ethnobotanical studies among indigenous communities are quite important (Maheshwari, 1983).

Around 10,000 kinds of wild plants are known to be used by tribles for basic health care, food, and other material necessities, according to recent research undertaken under the all Indiacoordinated research project on ethnobiology (AICRTE, 1992-98). Around 2000 of the 8,000 kinds of wild plants utilized by them for therapeutic purposes have been determined to have novel claims and warrant further investigation (AICRPE Final Technical Report 1998).

Ethnobotany, the scientific study of the interaction between humans and plants, is most often understood to pertain to research into traditional medicinal practices. Anthropology, botany, language, nutrition, conservation, economics, and pharmacology are just few of the fields that modern ethnobotany bridges in order to further human understanding (Balick 1996). A similar brochure, "Herbal plants keeping traditional wisdom alive," was published by the United Nations Educational, Scientific, and Cultural Organization (UNESCO) in 1998 to reach unreached people in the urban areas of the East and South East Asia and Pacific region.

According to the World Health Organization, over 85% of traditional medicine is extensively utilized in India, particularly in rural regions, where 70% of the population resides.

Several of India's most prestigious research organizations, including the Council for Scientific and Industrial Research (CSIR), Central Drug Research Institute (CDRI), Botanical Survey of India (BSI), and Tropical Botanical Garden and Research Institute (TBGRI), have made significant contributions to documenting the country's medicinal flora.

Sixty percent to eighty percent of the global population relies on medicinal plants for their therapeutic applications and antibacterial significance. The antimicrobial resistance found in therapeutic plants is effective against the microbes that cause illness. The ability of plants to kill microorganisms is a hot issue in the medical and pharmaceutical industries. As new medications are developed, the antibacterial activity of fighting agents is a primary factor in their efficacy.

With a seemingly endless supply of chemotherapeutants, as well as a wealth of other biochemicals with potential use in the creation of natural antibiotics, higher plants are an invaluable resource. It is likely that the pharmacological action of these medicinal plants is related to the existence of secondary metabolites that do not have any negative side effects. Antibiotic, antibacterial, insecticidal, pharmacological, and medicinal properties are only some of the biological actions they exhibit. Overuse of these drugs leads to the emergence of new strains of dangerous germs that are immune to their effects. As a result, the current investigation centered on the efficacy of crude plant extracts that have traditionally been employed as illness cures and preventative measures by tribal people due to their antibacterial qualities. To begin, I used microorganisms resistant to antibiotics to pick a few plants with notable antibacterial activity.

ETHNOLOGY OF THE TRIBAL GROUPS

India's indigenous communities each follow their own distinct social and cultural norms, which are determined solely by regional factors. In the Government of India Act of 1935, the term "tribes" appeared for the first time. Indian law recognizes "tribes" as "an endogamous group with an ethnic identity; that have retained their traditional, cultural identity; that have a distinct language or dialect of their own; that are economically backward and live in seclusion, governed by their own social norms and largely having a self-contained economy" (Article 342). Originally used by anthropologists to describe "a basic aggregation of people living in primitive or barbaric conditions under a headman or chief," the phrase "primitive tribes" has now come to mean a wide variety of groups. The most vulnerable population in modern India are the savage tribes.

Tribal peoples make up a sizable portion of India's population. There are more than 550 tribal tribes in India, including 93 Primitive Tribal Groups (PTGs) and 227 different ethnic groupings, all of whom are considered Scheduled Tribes (ST) by the government. Communities from all over the world use a wide variety of dialects to express themselves in one of the 325 official languages.

With 5.3% of the state's overall population, Andhra Pradesh's 26,31145 tribal people are a sizable minority. There are 23,44,474 people living in the vizianagaram district; 23,55,56 of them are tribal members (10.05). There are 27,03,114 people living in Srikakulam district, with 1,66,118 of them being tribal people (6.1). Andhra Pradesh is home to 33 distinct tribal communities, with a full list of the state's officially recognized scheduled tribes provided in Table 1. There are a total of 17 different indigenous communities spread over the Northern Andhra Pradesh agency area, including the Bagata, Gadaba, Kammara, KondaDoras, Khonds, Jatapus, Kotia, Kulia, Malis, Manne Dora, Mukha Dora, Porja, ReddiDoras, NookaDoras, Savaras, Goudus, and Valmiki. The research region is home to eleven different tribal tribes, four of which belong to a very undeveloped ethnic subgroup: the Gadaba, Khond, Porja, and Savara.

SAVARA TRIBE

As a subgroup of Andhra Pradesh's tribal population, savaras make up roughly 5.14 percent. They are located in a continuous band along the state of Orissa's border in the Vizianagaram and Srikakulam districts. Table 3 displays the current Savara population throughout the several districts of Andhra Pradesh. Many academics have used puranic, archaeological, and historical evidence to conclude that the Savara are a very old people group. A number of scholars, including Sitapati (1938-43) and Dubey (1964), have analyzed the Savara's appearances throughout the epics and puranas. According to SahityaDarpana, the Sabaras are a group of people who collect leaves and chop wood, and their language is either Sabari or Ahiri. The Sabara were mentioned in Khasikhand of Skandpurana as the forest dwellers who chopped down trees on a nomadic basis.

Some eminent scholars in the field of Indian archaeology and anthropology, including sankalia (1962) and haimendorf (1962), have identified the Savara as an ancient Indian indigenous people.

Sitapathi and Munro speculated that the influx of Aryans who had originally resided near the Vamsadhara River forced these people to abandon their homeland. They had to flee to the hills and woodlands because they were overrun by Hindus from the east. The names of several Srikakulam district village plains, as noted by Hanumantharao et al., are derived from savara terms.

The Vizianagaram District is home to the Savara people, who are concentrated in the G.L.Puram and Kurupammandals. In terms of tribal populations, the Savaras are among the most at-risk (PVTGs). They account for 3,1290 people (or 13 percent of the district's overall STpopulation) in total. The Savara make up 6.299% of Srikakulam's overall ST population, or 104652 people.

Health Care and Medicines

Most tribal peoples are uninformed and unconcerned about basic hygiene practices, yet owing to their diet and lifestyle, they are more resilient to common illnesses than their urban counterparts. Malaria, typhoid, and other illnesses, along with accidental injuries like scorpion and snake bites, are common among the local population. Most of these indigenous peoples really reside in rather inaccessible regions, far from the reach of modern medical care. As a result, they frequently see local doctors and herbalists (known as "Vaidhyas" or "Gurus") for help with health issues. The services provided by these "Gurus" and "Vaidya" give them a prominent place in tribal societies. They tend to be men rather than women, and the skills they've acquired are passed down down the generations. Each vaidya carries the community's religious confidence on his shoulders.

Traditional medicine relies exclusively on plants that grow wild in the area. Due to the availability of certain plants and plant parts during the rainy season, vaidyas spend most of their time in the forests collecting these items and preserving them for the rest of the year, or else preparing remedies right after collecting them. Herbalists treat patients by preparing medicines from a single plant or portions of numerous plants, which they then prescribe along with dosage and dietary guidelines. Folk medicine is used to treat everything from simple injuries like scrapes and burns to serious conditions like diabetes, asthma, high blood pressure, heart disease, rheumatism, digestive and urinary issues, etc. The natives here have a deep understanding of how to use herbs and other natural remedies to treat a wide range of illnesses.

ANTIBACTERIAL ACTIVITY OF MEDICINAL PLANT EXTRACTS

Further acquaintance with different ethnic groups has contributed to the development of research on natural products, to the increase in knowledge about the close relationship between the chemical structure of a certain compound and its biological properties, and to the understanding of the animal/ insect-plant interrelation (8). For these reasons, medicinal plants are important substances for the study of their traditional uses through the verification of pharmacological effects and can be natural composite sources that act as new anti-infectious agents. The present study aimed at evaluating the in vitro antimicrobial activity of plant (Allium sativum, Zingiberofficinale, Caryophyllusaromaticus, Cymbopogoncitratus, Mikaniaglomerata and Psidiumguajava) extracts against Gram-positive and Gram-negative bacterial strains isolated from human infections. For the preparation of plant extracts, samples of A. sativum (bulbs), Z. officinale (rhizomes) and C. aromaticus (flower buds) were obtained at the local commerce in April 2006 and used in natura. Cymbopogoncitratus (leaves) and Psidiumguajava (leaves) were collected in May 2006 from an experimental field of the School of Agronomical Sciences, Unesp, Botucatu, São Paulo, Brazil. Mikaniaglomerata (leaves) was collected around

Demétria farm, Botucatu, São Paulo, during the same period. The leaves were dried at approximately 50ºC and triturated in a mechanical mill. The voucher specimens were deposited in the Herbarium of the Department of Botany, Institute of Biosciences, Unesp, Botucatu-SP. The determined plant parts (200g) were ground, extracted with 70% methanol and filtered after 48hs. The plant residue was re-extracted by adding 70% methanol and filtered again after 48hs. Such procedure was repeated every 72hs, completing three filtration processes. The filtrate was concentrated on a rotary evaporator at 45ºC for methanol elimination, and the extracts were kept in sterile bottles under refrigerated conditions until use. The dry weight of the extracts was obtained by allowing the solvent to evaporate and was used to determine concentration in mg/mL. (Methodology based on Betoni et al. (3); Table 1). Microbial susceptibility assays using the agar dilution (Mueller-Hinton Agar) method (%v/v and corresponding mg/ mL values) and the Minimal Inhibitory Concentration (MIC) were carried out for fifteen Salmonella Typhimurium, S. aureus, Enterococcus sp and E. coli strains plus one ATCC strain of each bacterium. Overnight cultures (37ºC) in Brain HeartInfusion (BHI) were adjusted to 0.5 Mac Farlandstandard andinoculated on Petri plates by using a Steer's replicator. After37ºC/24 hours, MIC values (4,6) were read and MIC 50% and90% values calculated. Kruskal-Wallis test for significantanalysis ($p<0.05$) and Dunn's Test for multiple comparisonswere carried out. Then, the results mean values, whichrepresent the inhibitory capacity of each plant extract againstthe bacteria tested, were obtained and expressed as %v/v andmg/mL (Table 2).

Table 1. Characteristics of the plants extracts.

Scientific name	Common name	Part of the plant used	Extract dry weight (mg/mL)
Allium sativum	Garlic	Bulbs	133.0
Caryophyllus aromaticus	Clove	Flower buds	95.0
Zingiber officinale	Ginger	Rhizomes	17.0
Psidium guajava	Guava	Leaves	122.0
Cymbopogon citratus	Lemongrass	Leaves	75.0
Mikania glomerata	"Guaco"	Leaves	70.0

Table 2. Minimal inhibitory concentrations (MIC 50% and 90%) and mean values (%v/v and mg/mL) according to the plant extracts against Escherichia coli, Salmonella, Staphylococcus aureus and Enterococcus sp.

Plant Extracts	Bacteria spp.	*Escherichia coli*		*Salmonella*		*Staphylococcus aureus*		*Enterococcus* sp	
		%v/v	mg/mL	%v/v	mg/mL	%v/v	mg/mL	%v/v	mg/mL
Garlic	**MIC50%**	1.00	1.33	1.06	1.41	2.00	2.66	3.25	4.32
	MIC90%	1.04	1.38	1.21	1.61	2.00	2.66	3.67	4.88
	Median	1.000 a	1.330 a	1.100 a	1.460 a	2.000 b	2.660 b	3.375 a	4.485 b
Clove	**MIC50%**	1.22	1.16	1.60	1.52	0.41	0.39	1.15	1.09
	MIC90%	1.68	1.60	1.76	1.67	0.49	0.46	1.31	1.24
	Median	1.800 a	1.710 a	1.800 a	1.710 a	0.500 a	0.470 a	1.350 a	1.280 a
Guava	**MIC50%**	3.,70	4.51	1.90	2.32	0.55	0.67	1.25	1.52
	MIC90%	7.40	9.03	2.18	2.66	0.63	0.77	1.43	1.74
	Median	4.000 a	4.880 b	2.250 a	2.740 a	0.650 a	0.790 a	1.250 a	1.520 a
Guaco	**MIC50%**	30.00	21.00	30.00	21.00	4.67	3.27	12.86	9.00
	MIC90%	32.33	22.63	30.00	21.00	6.20	4.34	15.14	10.60
	Median	30.000 b	21.000 c	30.000 b	21.000 c	5.000 b	3.500 b, c	15.000 b	10.500 c, d
Lemongrass	**MIC50%**	40.00	30.00	40.37	30.28	19.00	14.25	17.50	13.12
	MIC90%	40.80	30.60	40.87	30.65	21.80	16.35	21.20	15.90
	Median	40.500 b	30.375 c	41.000 b	30.750 c	19.500 c	14.625 d	18.250 b	13.685 d
Ginger	**MIC50%**	41.00	6.97	41.00	6.97	45.11	7.67	46.00	7.82
	MIC90%	41.00	6.97	41.00	6.97	45.82	7.79	46.00	7.82
	Median	41.000 b	6.970 b	41.000 b	6.970 b	46.000 d	7.820 c	46.000 c	7.820 b, c

MIC 90% values were different among extracts. Garlic and ginger extracts showed high antimicrobial action against Gramnegative strains. Gram-positive bacteria were more susceptible to the other plant extracts. Clove extracts were highly effective against bacterial strains, especially S. aureus strain (Table 2). The antimicrobial properties of medicinal plants has been explained by the chemical association of active substances; however, the activity of their extracts is not related to their respective dry weights, which can be proven when moreMIC 90% values were different among extracts. Garlic and ginger extracts showed high antimicrobial action against Gramnegative strains. Gram-positive bacteria were more susceptible to the other plant extracts. Clove extracts were highly effective against bacterial strains, especially S. aureus strain (Table 2). The antimicrobial properties of medicinal plants has been explained by the chemical association of active substances; however, the activity of their extracts is not related to their respective dry weights, which can be proven when more

CONCLUSION

India, but also across the world, uses medicinal herbs, which makes a big difference in basic health care. A lot of people might benefit from herbal medicine, but not enough research has been done on it to make it a standard part of basic healthcare. Studies on the antimicrobial properties of plant extracts have been conducted extensively, although only a small fraction of the active chemicals present in higher plants have been isolated and studied. As a result, it is crucial to place a premium on researching plants having antibacterial action and protecting their traditional medicinal properties.

Covering basic health care requirements in underdeveloped nations sometimes relies heavily on the utilization of medicinal plants, which may provide novel sources of antibacterial, antifungal, and antiviral medicines with substantial action against infective microbes. Many types of pathogenic bacteria have been shown to be susceptible to medicinal plants' antibacterial activities. Around seven thousand pharmaceutically significant chemicals, including some current best-sellers like quinine, artemisinin, shikonin, and camptothecin, have been contributed by them to the Western pharmacopoeia. More than 80% of the world's population uses traditional medicine as their primary form of healthcare, per a World Health Organization survey.

Bacteria may cause life-threatening illnesses in both humans and animals. For instance, Staphylococcus aureus is responsible for both minor skin infections and food poisoning. No effective antimicrobial medicines exist against these bacteria, leading to a rising trend of nosocomial infections in hospitals and other healthcare facilities as they spread. Zones of inhibition vary significantly between gram-positive and gram-negative bacteria. The differences in cell wall and cell membrane components between gram-positive and gram-negative bacteria account for the observed inhibitory variations.

Antiviral, antibacterial, antifungal, antihelminthic, antimolluscal, and anti-inflammatory effects of plants have been the subject of numerous studies and publications (Mahesh and Satish 2008). The existence of secondary metabolites has been hypothesized to account for the impact seen by plant extracts. Extracts of medicinal plants were created, with the intention of using them in food as a kind of natural antimicrobials. To find plants with antibacterial properties, Kone et al., 2004 tested 50 medicinal plants. Sudanese traditional medicine plants were the focus of Elegami et al(2001) .'sethnobotanical and antibacterial research. Dogan, in 2010, conducted research on the antibacterial properties of Turkish medicinal herbs.

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