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Review paper

Phytotherapeutic Potential of Traditional Medicinal Plants
A Comprehensive Review

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ABSTRACT

Nature has given us access to a vast array of treatments for all human ailments. Many of the contemporary medications used in therapeutic settings come from natural sources. Many people in poor nations place a great deal of trust in herbal folk medicines as primary medical treatments. As a result, the value of these herbal remedies is rising in an arithmetic progression, but it is constrained because only a small number of the plant's elements have the ability to counter toxicities like mutagenic, carcinogenic, and teratogenic effects, among others. About 80% of the world's population relies mostly on traditional medicines for their primary healthcare, making traditional plant-based medicinal systems crucial to health care. This study attempts to present a thorough analysis of the scientific literature on the therapeutic use of conventional medicinal herbs. In order to better understand the pharmacological characteristics of these plants and to make new discoveries in the drug development process, researchers may find this overview to be useful.

1. Introduction

Herbal medicine is the oldest form of medicine known to humans. Early civilizations were totally dependent on herbal medicines and are still the most widely practiced form of medicine in the modern world. Plants produce many secondary metabolites which are derived from primary metabolites bio-synthetically and constitute an important source of many pharmaceutical drugs (Al-Snafi, 2016). A huge number of highly important modern drugs have been developed from the traditional plants used in traditional medicine (Patwardhan, 2004; Mallavadhani and Sahu, 2003). Since the beginning of human civilization, mankind has used medicinal plants for its therapeutic value. For hunderds of years, nature has provided medical substances, and an astounding number of modern medications have been identified from natural agents and these isolations were based on the uses of the agents in traditional medicine. India has several traditional medical systems, such as Ayurveda and Unani, which has survived through more than 3000 years, mainly using plant-based drugs. The ancient texts like Rig Veda (4500- 1600 BC) and Atharva Veda mention the use of several plants as medicine. The books on ayurvedic medicine such as Charaka Samhita and Susruta Samhita refer to the use of more than 700 herbs (Prasad and Ray, 2015). The use of traditional medicines and medicinal plants in most developing countries as therapeutic agents for the maintenance

of good health has been widely observed (UNESCO, 1996). Modern pharmacopoeia still contains at least 25% drugs derived from plants and many others, which are synthetic analogues, built on prototype compounds isolated from plants. Interest in medicinal plants as a re-emerging health aid has been fuelled by the rising costs of prescription drugs in the maintenance of personal health and well-being and the bioprospecting of new plant-derived drugs (Lucy and Edgar, 1999). The ongoing growing recognition of medicinal plants is due to several reasons, including escalating faith in herbal medicine (Kala, 2005). The medicinal properties of plants could be based on the antioxidant, antimicrobial and antipyretic effects of the Phytochemicals in them (Cowan et al, 1999). Phytotherapy is the nexus of nature among two living worlds where the humanity and plants meet to create an interchange synergistic energy at such point where the internal and external framework of the body may resonate and become attenuated. Since the ancient period, people are using herbal medicines to alleviate pain and cure illnesses (Campbell and Ronney, 2018; Srivastava, 2018). According to World Health Organization, medicinal plants would be the best source to obtain a variety of drugs. Hence such plants should be investigated to better understand their properties, safety and efficacy (Nascimento et al., 2000). According to the World Health Organization (WHO, 1977) "a medicinal plant" is any plant, in which one or more of its organ contains substances that can be used for the therapeutic purposes or which, are precursors for the synthesis of useful drugs. This definition distinguishes those plants whose therapeutic properties and constituents have been established scientifically and plants that are regarded as medicinal but which have not yet been subjected to thorough investigation. The term "herbal drug" determines the part/parts of a plant (leaves, flowers, seeds, roots, barks, stems, etc.) used for preparing medicines. Furthermore, WHO (2001) defines medicinal plant as herbal preparations produced by subjecting plant materials to extraction, fractionation, purification, concentration or other physical or biological processes which may be produced for immediate consumption or as a basis for herbal products. Knowledge on therapeutic plants started to decline because the information on the use of plant species has been passed from one generation to the next through oral tradition, thus become obsolete through the lack of recognition by younger generations as a result of a shift in attitude and ongoing socioeconomic changes (Kala et al., 2006). In India, the Ayurveda system has described a large number of plant or plant product based medicines and the determination of their morphological and pharmacological or pharmacognostical characters which can provide a better understanding of their active principles and mode of action.

The term "Pharmacognosy" is Greek word "Pharmacon meaning drug" and "gignosco meaning to acquire knowledge of the drug (Anubha et al., 2017). It has correlation with the chemistry and scientific studies of medicinal plant. Pharmacognosy is a multidisciplinary science of natural medicines which enables identification, characterization, production, and standardization of the drug from plant origin and is developing with professional streams such as Biochemistry, Ayurveda, Toxicology, Pharmacology, Molecular Biology, Bioinformatics and emerging as Analytical Pharmacognosy, Clinical Pharmacognosy, Industrial Pharmacognosy (Taviad and Vekariya, 2018; Dhami, 2013; Kazemi et al., 2012; Bruhn and Bohlin, 1997). Thus pharmacognostic evaluation and quality assessment of raw drugs are mandatory for developing the phytomedicines (Sen and Chakraborty, 2017).

The phytomedicine have become a recognized tool in the treatment of many human diseases. The medicinal plants are regaining their value, which has not only lead to the encouragement of validating the traditional value but also for their proper identification, isolation and characterization of phytoconstituents (Fennell et al., 2004). The advantages of the use of phtomedicine are that they have less side effects than allopathic drugs and have good therapeutic potential and is of reasonable price. The phytomedicine have shown a wide range of activities which makes possible their use in the management of various diseases. The presence of the biological activities is crowned to the presence of alkaloids, flavonoids, phenolics, terpenoids, saponins, tannins, anthraquinones etc.

2. Phytotherapy as a Ray of Hope

There is a huge demand for plant based medicines, health products, pharmaceuticals, food supplements, cosmetics etc. Since from ancient times, several societies have resorted to nature, mainly to plants as medical and health sources. Today, a large number of world population particularly in developing countries, uses plants for facing primary needs of medicinal assistance (Tene et al., 2007). Medicinal plants have been a part of modern life style and plants are a source of important therapeutic aid for treating human illness (Kamboj, 2000). According to an estimate of the world health organization (WHO), about 80% of the world population still uses herbs and other traditional medicines for their primary health care. In traditional Ayurveda medicine, herbs were used as special foods, serving to eliminate the excesses as well as strengthen the deficiencies, restore and rejuvenate various types of vitamins, proteins and other minerals present in our body (Korhalkar et al., 2012). Plant is an important source of medicine and plays a key role in world health (Sandberg et al., 2005). Medicinal plants may be

defined as those plants that are commonly used in treating and preventing specific ailments and diseases and that are generally considered to be harmful to humans (Schulz et al., 2001). Plants that possess therapeutic properties or exert beneficial pharmacological effects on the human body are generally designated as medicinal plants. Medicinal plants naturally synthesize and accumulate some secondary metabolites like alkaloids, terpenes, sterols, flavonoids, glycosides, cyanogenics, resins, lactones, quinines, volatile oils etc (Alam, 1992). Researchers have found that people in different parts of the world tend to use the same or similar plants for the treatment of the same illnesses. The use of plants for treating diseases is as old as the human species. Popular observation on the use and efficacy of medicinal plants significantly contribute to the disclosure of their therapeutic properties, so that they are frequently prescribed, even if their chemical constituents are not always completely known. For example, *Sennaalata* is used traditionally in Nigeria to treat bacterial and fungal infections (Sule et al., 2011). They also showed varying degrees of antibacterial and antifungal activities against pathogens. Flavonoids have been found to exhibit a greater antifungal and antibacterial activity against some human pathogens, fungi and bacteria (owoyale et al., 2005). Recently World Health Organization (WHO) estimated that 80% of people rely on herbal medicines partially for their primary health care and 35,000 to 70,000 species had been used as medicaments. Plants have been used for medicinal purposes long before prehistoric period. Ancient Unani manuscripts *Egyptian papyrus* and Chinese writings described the use of medicinal plants. Evidence exist that Unani Hakims, Indian vaids, European and Mediterranean cultures were using herbs for over 4000 years as medicine. Traditional systems of medicines continue to be widely practised on many accounts. Population rise, inadequate supply of drugs, prohibitive cost of treatment, side effects of several synthetic drugs and development of resistance to currently used drugs for infectious diseases have led to increased emphasis on the use of plant materials as a source of medicines for a wide variety of human ailments. The ancient scholars only believed that herbs are only solution to cure a number of health related problems and diseases. They conduct through study, experiment to arrive at accurate conclusion about the efficacy of different herbs that have medicinal value. Most of drugs, thus formulates, are free of side effects or reaction. This is the reason why herbal treatment is growing popularity across globe. These plants that have medicinal quality provide rational means for the treatment of many internal diseases, which are otherwise considered difficult to cure (Schulz et al., 2001). Medicinal plants such as Aloe, Tulsi, Neem, Turmeric and Ginger cure several common ailments. In 20thcentury, more than 30 cardiac glycosides have been isolated from dried foxglove leaves including digitoxin and digoxin (Balick et al., 2000).

3. Plant products as antioxidants and free radical scavengers

An antioxidant is any substance that can prevent or reduce the oxidation of the cell components as DNA, proteins and lipids. Plant natural products are being extensively used as antioxidants for their capacity to protect organisms and cells from oxidative damage. For example, although *Mentha spicata* is commonly used as a crop for their essential oil for food products and cosmetics. Spearmint also produces Rosmarinic acid (RA), an antioxidant which is important in modulating inflammatory diseases such as asthma, allergies and atherosclerosis. Recently, a potent antioxidant named Canolol was isolated from crude canola oil and was found to be more active than other common antioxidants such as Tocopherol. Although, the artificial antioxidants such as Butylated Hydroxytoluene (BHT) or Butylated Hydroxyanisole (BHA) are commonly used in food industry as neutralizing agents of free radicals, their uses is linked with toxicity or mutations problems. Hence, it's very important to find normal alternative antioxidants with high safety. Antioxidants originated from natural plant sources are more potent and safe due to their harmless nature. Natural antioxidants are widely distributed in food and medicinal plants. These natural antioxidants, especially polyphenols and carotenoids, exhibit a wide range of biological effects, including anti-inflammatory, anti-aging, anti-atherosclerosis and anticancer. The effective extraction and proper assessment of antioxidants from food and medicinal plants are crucial to explore the potential antioxidant sources and promote the application in functional foods, pharmaceuticals and food additives.

4. Medicinal plants as microbial agents

Medicinal plants contain a wide variety of secondary metabolites or compounds such as tannins terpenoids, alkaloids, flavonoids; that dictates the therapeutic potency of the plants most especially the antimicrobial activities. Similar phytochemical constituents such as flavonoids and tannins were also revealed to be active against pathogenic bacteria such as *Bacillus cereus*, *Staphylococcus aurous* amongst others. The tannins present in medicinal plants make it useful in production of antiseptic soap which are commonly used in bathing or cleansing of skin surfaces. It was documented in literature that phytochemicals can be toxic to filamentous fungi, yeasts and bacteria, and also, inhibitory to viral reverse transcriptase. Saponins were reported as a

major components acting as antifungal secondary metabolite. A wide range of physiological activity of saponins, steroids, phenols and tannins are found to be more predominant and therefore may be responsible for the antimicrobial action.

5. Medicinal plants as nephro-protective agents

Nephrotoxicity is one of the most common kidney problems and occurs when body is exposed to a drug or toxin. A number of therapeutic agents can adversely affect the kidney resulting in acute renal failure, chronic interstitial nephritis and nephritic syndrome because increasing number of potent therapeutic drugs like aminoglycoside antibiotics and chemotherapeutic agents. Nephro-protective agents are the substances which possess protective activity against nephrotoxicity. Medicinal plants have curative properties due to the presence of various complex chemical substances. Co-administration of various medicinal plants possessing nephron-protective activity along with different nephrotoxic agents may attenuate its toxicity (Hoitsma et al., 1991; Paller, 1990). The following are some of the medicinal plants possessing nephron-protective activity. (Kanchan et al., 2012);

Name of the plant and Chemical constituents

Aerva javanica: Isoquercetin, 5 methylmellein, 2-hydroxy-3-O-β primeveroside naphthalene-1, 4-dione, Apigenin7-Oglucoronide and kaempferol.
Aerva lanata: β-sitosterol, Amyrin, Hentriacontane, Campesterol, Stigmasterol, Kaempferol, Starch, Propionic acid, β-carboline-I, Aervoside, Aervolanine.
Bauhinia variegatea: Stigmasterol, flavone glycosides, lupeol, kaempferol-3-glucoside, β-sitosterol.
Cassia auriculata: Di-(2-ethyl) hexyl phthalate, Alkaloids, Resins, Ca2+ and Phosphorous.
Carica papaya: Flavonoids, Phenols, Alkaloids, Protein, Sterols, Terpenoids, Carbohydrates, Steroids, Tannins, Glycosides, Terpenes and Saponins.
Ceratonia silique*:* Flavonoids.

6. Medicinal plants as Hepatic-protective agents

Liver has a pivotal role in regulation of physiological processes. It is involved in several vital functions such as metabolism, secretion and storage. Furthermore, detoxification of a variety of drugs and xenobiotics occurs in liver. The bile secreted by the liver has, among other things, an important role in digestion. Liver diseases are among the most serious ailments. They may be classified as acute or chronic hepatitis (inflammatory liver diseases), hepatitis (non-inflammatory diseases) and cirrhosis (degenerative disorder resulting in fibrosis of the liver). Liver diseases are mainly caused by toxic chemicals (certain antibiotics, chemotherapeutics, peroxidised oil, aflatoxin, carbon-tetrachloride, chlorinated hydrocarbons, etc.), excess consumption of alcohol, infections and autoimmune disorder. Experiments have clearly shown that plants such as *Picrorrhiza kurroa*, *Andrographis paniculata*, *Eclipta alba*, *Silibum marianum, Phyllanthus maderaspatensis and Trichopus zeylanicus* are sufficiently active against, at least, certain hepatotoxins.. *P. kurroa*, *E. alba, Glycyrriza glabra*, *A. paniculata* and *P. amarus* are likely to be active against Hepatitis B virus (Kumar et al., 2012).

7. Medicinal plants as anti-cancer agents

Most of the drugs used in cancer treatment today are not effective enough or have some serious side effects, thus new anticancer drugs are needed to combat cancer. Natural resources particularly medicinal plants play a very significant role for the discovery and development of new drug leads. Clinically used anticancer drugs such as vincristine, vinblastine, vindesine, paclitaxel, etoposide, teniposide, irinotecan and topotecan are natural products or their derivatives which are produced by semi-synthesis from a natural molecule (Saklani and Kutty, 2008). Vinblastine and vincristine were the first plant-based drugs used clinically for the treatment of cancer. These compounds are primarily used in combination with other cancer chemotherapeutic drugs for the treatment for a variety of cancers, including leukaemia, lymphomas and breast and lung cancer (Cragg et al., 1997). The recent research reports that the metabolites derived from plants possess potential to inhibit and delay the multistage process of tumour growth (Surhyj et al., 1998). In modern medicine the secondary metabolites isolated from plants are evaluated for their anticancer efficacy and resulted in the discovery of 30 effective anticancer drugs (Lamartimare, 1998). The essential advantages of plant based medicines are their safety, efficacy and affordability (Siddiqui, 2012).

8. Conclusion

We summarized the ethnomedicinal knowledge on plants used to cure various ailments from times immemorial and medicinal utility on the management of diabetes, cancer, inflammation and associated symptomatology, as well as the available scientific evidence on their use, mostly based on their pharmacological profiles and identified bioactive constituents. In-depth disclosure of their scientific studies is necessary in order to provide a more rational utilization of these folk remedies.

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Conflict of Interest

Authors declare that they have no conflict of interest

Abbreviations

WHO	World Health Organisation
UNESCO	United Nations Educational, Scientifuic and Cultural Organisation
RA	Rosmarinic acid
BHT	Butylated hydroxytoulene
BHA	Butylated hydroxyanisole

Author Contributions

M.M.M: conceptualization, supervision, resources, writing—review and editing
T.A.S: conceptualization, methodology, writing—original draft preparation; All authors have read and agreed to the published version of the manuscript.

References

1. Al-Snafi, A.E., 2016. Medicinal plants with anticancer effects (part 2)-plant based review. *Sch Acad J Pharm*, *5*(5), pp.175-193.
2. Patwardhan, B., Vaidya, A.D. and Chorghade, M., 2004. Ayurveda and natural products drug discovery. *Current science*, pp.789-799.
3. Mallavadhani, U.V. and Sahu, G., 2003. Pterostilbene: A Highly Reliable Quality-Control Marker for the Ayurvedic Antidiabetic Plant Bijasar'. *Chromatographia*, *58*(5), pp.307-312.
4. Prasad, r.s. and ray, m.,2015, study on conservation, mass multiplication and propagation through shoot cutting of gymnema sylvestre. *Annals of plant and soil research*, p.462.
5. UNESCO Report,1996
6. Hoareau, L. and DaSilva, E.J., 1999. Medicinal plants: a re-emerging health aid. *Electronic Journal of biotechnology*, *2*(2), pp.3-4.
7. Kala C.P., 2005. Current status of medicinal plants used by traditional Vaidyas in Uttaranchal state of India
8. Cowan, M.M., 1999. Plant products as antimicrobial agents. *Clinical microbiology reviews*, *12*(4), pp.564-582.
9. Campbell, J.N. and Rooney, S.M., 2018. Part One: Alkaloid Heterotopias. In A Time-Release History of the Opioid Epidemic (pp. 9-58). Springer, Cham
10. Srivastava, A.K., 2018. Significance of medicinal plants in human life. In Synthesis of Medicinal Agents from Plants (pp. 1-24).
11. WHO 1997, monographs on medicinal plants
12. Nascimento, G.G., Locatelli, J., Freitas, P.C. and Silva, G.L., 2000. Antibacterial activity of plant extracts and phytochemicals on antibiotic-resistant bacteria. *Brazilian journal of microbiology*, *31*(4), pp.247-256.
13. WHO 2001, Report on medicinal plants
14. Kala, C.P., Dhyani, P.P. and Sajwan, B.S., 2006. Developing the medicinal plants sector in northern India: challenges and opportunities. *Journal of Ethnobiology and Ethnomedicine*, *2*(1), p.32
15. Anubha, C., Sandeep, G. and Mohan lal, J., 2017. Pharmacognostical Evaluation of Rhizome of *Zhngiber officinale* Rosc. European Journal of Pharmaceutical and Medical Research, 4, pp. 324-328.
16. Taviad, K. and Vekariya, S., 2018. The Scope of Pharmacognosy Today &Tomorrow. International Journal of Pharmacognosy and Chinese Medicine, 2(1),pp. 1-2.
17. Dhami, N., 2013. Trends in Pharmacognosy: A modern science of natural medicines. *Journal of herbal medicine*, *3*(4), pp.123-131
18. Kazemi, M., Eshraghi, A., Yegdaneh, A. and Ghannadi, A., 2012. "Clinical pharmacognosy"-A new interesting era of pharmacy in the third millennium. DARU Journal of Pharmaceutical Sciences, 20 (18), pp. 1-3
19. Bruhn, J.G. and Bohlin, L., 1997. Molecular pharmacy-ognosy: an explanatory model. *Drug discovery today*, *6*(2), pp.243-246
20. Sen, S. and Chakraborty, R., 2017. Revival, modernization and integration of Indian traditional herbal medicine in clinical practice: Importance, challenges and future. *Journal of traditional and complementary medicine*, *7*(2), pp.234-244.
21. Fennell, C. W., Lindsey, K. L., Mc Gaw, L. J., Sparg, S. G., Stafford, I., Elgorashi, E. E., Grace, O. M., Van, S. J. (2004). Assessing African medicinal plants for efficacy and safety: pharmacological screening and toxicology. *J. Ethnopharmacol.* 94(2-3):205-17.
22. Tene, V., Malagon, O., Finzi, P.V., Vidari, G., Armijos, C. and Zaragoza, T., 2007. An ethno botanical survey of medicinal plants used in Loja and Zamora-Chinchipe, Ecuador. *Journal of ethno pharmacology*, *111*(1), pp.63-81.
23. Kamboj, V.P., 2000. Herbal medicine. *Current science*, *78*(1), pp.35-39.
24. Korhalkar Anagha, Deshpande Manasi, Lele Priya, Modak Meera, (2012), Global J Res. Med. Plants & Indigen. Med. 1, (12): pp 687–693.
25. Sandberg, F., Perera-Ivarsson, P. and El-Seedi, H.R., 2005. A Swedish collection of medicinal plants from Cameroon. *Journal of Ethnopharmacology*, *102*(3), pp. 336-343.
26. Schulz, V., Hänsel, R. and Tyler, V.E., 2001. *Rational phytotherapy: a physician's guide to herbal medicine*. Psychology Press.
27. Alam, M.K., 1992. Medical ethnobotany of the Marma tribe of Bangladesh. *Economic Botany*, pp.330-335.
28. Sule, W.F., Okonko, I.O., Joseph, T.A., Ojezele, M.O., Nwanze, J.C., Alli, J.A. and Adewale, O.G., 2010. In vitro antifungal activity of Senna alata Linn. crude leaf extract. *Research journal of biological sciences*, *5*(3), pp.275-284.
29. Owoyale, J.A., Olatunji, G.A. and Oguntoye, S.O., 2005. Antifungal and antibacterial activities of an alcoholic extract of Senna alata leaves. *Journal of Applied Sciences and Environmental Management*, *9*(3), pp.105-107.
30. Balick, M.J., Kronenberg, F., Ososki, A.L., Reiff, M., Fugh-Berman, A., Roble, M., Lohr, P. and Atha, D., 2000. Medicinal plants used by Latino healers for women's health conditions in New York City. *Economic botany*, *54*(3), pp.344-357.

31. Hoitsma, A.J., Wetzels, J.F. and Koene, R.A., 1991. Drug-induced nephrotoxicity. *Drug safety*, *6*(2), pp.131-147.
32. Paller MS, 1990, "Drug induced nephropathies", Med Clin.
33. Gaikwad, K., Dagle, P., Choughule, P., Joshi, Y.M. and Kadam, V., 2012. A review on some nephroprotective medicinal plants. *International journal of pharmaceutical sciences and research*, *3*(8), p.2451.
34. Kumar, S.V., Sanjeev, T., Ajay, S., Kumar, S.P. and Anil, S., 2012. A review on hepato protective activity of medicinal plants. *International Journal of Advanced Research in Pharmaceutical & Bio sciences*, *1*(2), pp.31-39.
35. Saklani, A., Kutty, S.K., 2008. Plant-derived compounds in clinical trials. Drug Discovery today 13, 161–171
36. Cragg, G.M., Boyd, M.R., Khanna, R., Newman, D.J. and Sausville, E.A., 1999. Natural product drug discovery and development. *Phytochemicals in Human Health Protection, Nutrition, and Plant Defense*, pp.1-29.
37. Sahayaraj, P.A., Gowri, J., Dharmalingam, V., Shobana, R. and Prema, A.A., 2015. Phytochemical screening by FTIR spectroscopic analysis of leaf and stem extracts of Wedelia biflora. *Int J Nano Corros Sci Eng*, *2*(5), pp.322-334
38. Lambertini E, Piva R, Khan MT, Lampronti I, Bianchi N, Borgatti M, et al. Effect of extracts from Bangladeshi medicinal plants on in vitro proliferation of human breast cancer cell lines and expression of estrogen receptor alpha gene. Int J Oncol 2004;24:419.
39. Siddiqui, B.S., Ali, S.T., Rizwani, G.H., Begum, S., Tauseef, S. and Ahmad, A., 2012. Antimicrobial activity of the methanolic bark extract of Holarrhena pubescens (Buch. Ham), its fractions and the pure compound conessine. *Natural product research*, *26*(11), pp.987-992.