

AN EXTENSIVE REVIEW ON MEDICINAL PLANTS IN THE SPECIAL CONTEXT OF ECONOMIC IMPORTANCE

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ABSTRACT

Our health-care system would be incomplete without the use of medicinal herbs. In the days before modern medicine, several communities created medical knowledge systems known as “traditional medicine,” “indigenous medicine,” or “folk medicine.” The medicinal properties of plants and plant-based products are widely accepted. There are a variety of medical approaches available across the world, including allopathic, homeopathic, Ayurvedic, and Chinese. The developed communities each have their own *Materia Medica*, which compiles thorough data on many plants used as medicines. According to current estimations from the field of botany, there are somewhere between 2,50,000 and 3,50,000 distinct plant species in existence. It is estimated that 35,000 unique species are used to cure a wide range of ailments in diverse places throughout the world. Based on general popularity among all ages, phytopharmaceuticals are an integral part of worldwide business and the global economy. According to a globe news wire study, the global herbal medicine market is estimated to be 550 billion dollars by 2030, up from 83 billion dollars in 2019. China and India lead the global herb market. China exports 120,000 tonnes of herbal remedies annually, followed by India with 32,000 tonnes. Europe is the world’s largest importer of medicinal plants (MP), taking in over 400,000 tonnes annually to fulfill local demand. In this review, we have discussed about the MP and their economic importance in global market.

Keywords: Medicinal plants, Economic importance of medicinal plants, World economic market of traditional medicine, Import export of traditional medicine, Medicinal plants and human health.

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INTRODUCTION

Plants have an essential part in the health of the vast majority of people worldwide. Approximately 2 million traditional health practitioners in India employ medicinal plants (MP) to treat a variety of diseases [1-4]. The use of therapeutic plants dates back to the beginning of human history [5-7]. In the form of traditional and folkloric medicine, the history of a plant is based on the extensive experiences of a large number of different healers, which may have been passed down from ancestors or evolved via the author’s own experiences over the course of time [8]. Importantly, the profound knowledge contained in this natural medicinal resource has not been tainted by any recent cultural upheavals. Therefore, none of the two existing methods of therapy can normally stake a claim to having invented it. Examples of well-developed systems of treatment include traditional techniques of therapy such as the Ayurvedic, homeopathic, and allopathic systems of medicine [9-12]. These methods of treatment differ from one another in both ideas and processes. *Materia Medica* is a compendium of extensive information on a range of plants that are used for medicinal reasons in more developed countries [13]. When this natural human pharmacy is combined with the incredible progress being made in other fields of medical research today, it surely provides the framework for a revolution in the traditional health-care system that is much needed.

Botanical research estimates that there are between 2,50,000 and 3,50,000 different plant species on the world. On the other hand, it is only stated that 35,000 distinct species are employed for the treatment of a variety of illnesses in various regions of the world [14]. Because these plants are utilized almost exclusively in their unprocessed or semi-processed forms, and because they are frequently combined, quality control testing and stringent clinical studies are required for scientific justification [15,16]. According to the findings of a study [16-18], researchers estimated that only around 15% of MP had undergone

phytochemical analysis, while only about 6% had undergone biological screening. The remainder of the plants was left alone, which means that this treatment method has a huge amount of potential when it comes to the development of new and more efficient medicinal agents.

On the basis of widespread approval among people of all ages, phytopharmaceuticals are depicted as an essential component of international commerce and the global economy [19]. It was projected that the overall worldwide herbal industry for medications derived from plants was worth 18 billion dollars in 2005, in 2019 it increase to 83 billion dollar and according to the globe news wire report, it is expected the global herbal medicine market will be 550 billion dollar by 2030 [20,21]. It should come as no surprise that China and India dominate the worldwide market for the trading of herbs. It is projected that China exports more than 120,000 tonnes of herbal medications each year, followed by India with an export volume of roughly 32,000 tonnes. Europe, on the other hand, is the world’s largest importer of MP, bringing in roughly 400,000 tonnes each year from a range of European nations to meet local demand for herbal remedies [22,23].

The high trust that the English population has in natural medicines was reflected in a report that was presented to the British parliament. In 2002, residents of the United Kingdom visited the clinics of 50,000 herbal practitioners, spending a total of 126 million pounds [24]. There has been a noticeable shift toward the increased use of herbal goods in the United States [22], and the overall market for herbal products is 230 billion dollar in 2021 and was projected to be worth 430 billion dollar in 2028. Over the course of recent history in the United States of America, there has been a discernible rise in the use of various herbal cures. Countries in Europe have reported experiencing the similar pattern of events. It is projected that over-the-counter (OTC) sales of herbal remedies have generated close to 73.4 billiondollars in revenue in 2020 (Fortune Business

insight). Notably, Germany and France are the two leading countries when it comes to herbal remedies [9,25]. To be more specific, 50% of Germans have shown faith in herbal medicines as a method for the treatment of a variety of disorders. In a similar vein, the use of herbal preparations as cures in the home is highly prevalent in a variety of Asian and African nations [26]. There are several chemicals taken from MP or manufactured from them that today hold a significant market share in every part of the world in the modern era of medicinal engineering. Ndhlala *et al.*, [27] referenced the World Health Organization (WHO) and stated that roughly 11% of the approximately 250 medications considered important for basic health care are plant-based. Antimalarials antihypertensive reserpine, anticancer therapies paclitaxel, docetaxel, irinotecan, and etoposide, digitalis (cardiotonic), morphine (narcotic analgesic), and turbocurarine are all examples of medications that may be used in their natural state (Muscle relaxant). Traditional Chinese Medicine is defined as "preparations and/or finished products made from whole plants or parts of plant materials" (including leaves, barks, berries, flowers or roots) by the WHO as "active ingredients made from whole plants or parts of plant materials" (including leaves, barks, berries, flowers, or roots). When developing a new product, indigenous, and local cultures use MP as a means of curing a certain illness. Botanical medications are another name for herbal remedies [28].

In recent years, Pakistan has been an active participant in the global trade of MP. Despite the fact that Pakistan is the ninth largest importer of medical plants (11,350 tonnes), it is the tenth largest exporter of MP (8100 tonnes), which demonstrates the country's potential [11]. More than 10.5 million dollars in quality plant products are sold annually in Pakistan. For a total of 49 million dollar, 78 million dollar and 87 million dollars herbal medication was sold in Pakistani herbal markets during 1999, 2000, and 2001, respectively [29]. The country's herbal sector has not thrived throughout the course of time, and as a result, the country relies heavily on the importation of raw materials. This is an important issue to emphasize. The cultivation of MP is strongly encouraged for the purpose of ensuring the continued growth of the herbal industry through the implementation of contemporary scientific techniques [30-33]. This is not only to satisfy the ever-increasing demand in the local market, but also to generate revenue through the export of plant-based goods.

MARKET VALUE OF MP

As much as 80% of the world's population is reported to utilize herbs, with percentages as high as 95% in the developing countries [34,35]. The use of herbs in the United States continues to rise [36,37]. According to Barnes *et al.*, [38] Natural products (mainly herbs) were utilized by 17.7% of individuals in a 1-year period, acco. Whites (43.1%) and Hispanics (28.8%) were the most frequent users of complementary and alternative medicine (CAM) (23.7%). Hispanics, particularly the elderly, were found to utilize herbs at significantly higher rates than the general population in studies conducted in the El Paso area (between 59% and 70%) [39]. There is a chance that some methods underestimate usage rates. In most research, the rate of reporting herb usage to health-care practitioners is extremely low (a major concern). Two major factors contributed to the low rates: Providers failed to inquire about herbal use or expressed unhappiness with herbal use. We have found that the most often utilized herbs in different countries depend on the items they are in and the customs of the region. Adding herbs to energy drinks, diet pills, and other nutritional supplements are a relatively new Western fad [40,41].

Ayurvedic medicine is expected to grow at a rate of 20% every year [42]. In the 10 years from 1987 to 1996, MP sales in India increased by approximately 25%, the highest growth rate in the world [43]. Despite this, India's annual expenditure on medications is among the lowest in the world's developed nations [43]. Plants are the primary source of medication in many underdeveloped countries [43,44]. China and India are two of the world's greatest consumers of medicinal herbs [43,45].

Indian and Chinese traditional medicine each employ about 7,000 plant species [46,47]. According to the export import Bank of the United States, the worldwide market for MP-related commerce has grown by 7% annually [48,49]. More than half of the global herbal market is owned by China compared to just 1% by India [42].

India's MP exports total Rs. 1200 million each year. Almost all of the main herbal pharmaceutical companies are experiencing steady sales increases in the range of 15–20% every year [42]. It has been a source of alternative medicine, innovative medications, and healthcare goods that have come from traditional medicine [50,51]. Medical plants play an essential role in pharmaceutical research and medication development since they can be utilized to synthesize new pharmaceuticals or as starting materials for the creation of existing ones [43]. Medicinal herbs are a major source of many modern pharmaceuticals. MP compounds are non-narcotic and have minimal to no negative effects [42,52].

National status

The use of herbal medicines is on the rise, and the market is expanding at a steady pace [53,54]. Over the past several years, the Indian herbal medicine market has grown at a pace of 15%, whereas the pharmaceutical business has grown at a rate of 29% (Pharmaceutical.gov.in). Exports of MP and herbs from India have increased dramatically during the last few years. In 2020, India will be the second-largest producer of castor seed in the world, with a production capacity of 2.036 million tonnes. In recent years, India has exported medicines such as isabgol, opium alkaloids, cinchona alkaloids, vinca extract, ipecac root alkaloids, solasodine, Menthol, Gudmar herb. Mehdi leaves and Papian. *Rauwolfia* Guar Gum. Jasmine oil. Agar wood oil and sandalwood oil [55]. As OTC products, ethical and classical formulations, and traditional home therapies in India, herbal medicines earn over 1 billion dollar in revenue each year, while crude herbal extract exports make roughly 456.12 million dollars [56].

There are an estimated 25,000 licensed Indian system of medicine pharmacies in India. At present, more than 3,000 different medication combinations have been approved for sale in the United States. About 8000 MP are used in India's herbal industry [42].

There are an estimated 8000 medicine manufacturers in India, although only 25 of them may be considered large-scale manufacturers. About 27.7 million dollar was spent on Ayurvedic and Unani medicines each year in India's herbal business as a whole. 31.7 million dollar was again generated in 1998–1999, and 48.9 million dollar was generated in 1999–2000 of the entire turnovers of Ayurvedic and herbal products. Indian herbal medication exports are estimated to be in the range of 80 million dollar [42].

International status

It's nearly hard to estimate global herb sales; therefore, any estimates that have been made are likely to be conservative. This can be attributed to the fact that herbs are used in so many different ways (e.g., food products, energy drinks, multivitamins, and raw form) [57]. The global market is estimated by the WHO to be worth over 83 billion dollars yearly [58]. Profits play a large role in the marketing and sales of various herbs in particular nations. The use of herbs in other countries, on the other hand, can be a more cost-effective method of treating specific ailments or diseases. Herbal medications are currently worth more than 61 billion a year on the global market. The average yearly growth rate for herbal medicine sales is predicted to be 6.4% [8]. The global market for herbal medicines has risen at a rapid pace due to a number of important factors. There is a growing interest in CAM, as people are concerned about the side effects of modern medications and believe that herbal medicines, which have been in use for millennia by millions of people around the world, have no side effects. People also prefer preventive medicine due to the ageing of the population. It is estimated that herbal medicines have a global market worth of approximately 43 billion dollar each year, according to the WHO.

MP AND THEIR SOCIO-ECONOMIC IMPORTANCE

MP and human health

A MP is any plant used to make medications or their precursors that are used to treat, halt or modify pathogenic and physiological processes. A phytopharmaceutical preparation, sometimes known as herbal medicine, is any manufactured treatment that is generated entirely from plants, either as a pharmaceutical formulation or in its natural state [44,59-63]. Pharmaceutical medications and other health goods are created from MP, which are essential sources everywhere in the world but are vanishing alarmingly fast [64,65]. One of the most significant economic advantages of biodiversity has been the commercial worth of MP [66]. Due to their important benefits to the population's access to affordable healthcare, livelihood security, and economic well-being, MP are acknowledged as the most valuable non-timber forest products [67-69]. The use of natural medicines has attracted increased attention in recent years. Two essential factors that must be taken into account during the development of herbal medications are quality control and safety [70]. Since time immemorial, almost all societies have employed MP as a source of medicine. Every known ancient culture has its own incredible and effective medical and healthcare systems including Egyptian, Babylonian, Jewish, Chinese, and Indus-valley civilizations. Regarding the cultivation and commercialization of MP, as well as their benefits to personal healthcare, social and economic well-being, and national economies, there is a dearth of research and policy interventions in developing nations [71]. Similar to every other civilization on earth, Indian culture has long relied on aromatic and medicinal herbs to protect its citizens' health [22,72,73]. Due to factors such as human encroachment, rising population, and others, these therapeutic plants are challenged. Both developed and natural environments can provide MP. Up to six or seven marketing stages, such as primary collectors and producers, neighborhood contractors, regional wholesale markets, substantial wholesale markets, and specialized, might be included in the supply chain. Different regulations apply to the cultivation, management of natural resources, harvesting, processing, and, most importantly, commercialization of supply chains for MP [61]. A large number of stalk holders contribute significantly to managing and conserving therapeutic plants through various means. Plant materials' beneficial therapeutic effects frequently result from secondary product combinations present in the plant. The plant is used in many nations for its healing qualities in routine medical treatment. Indigenous peoples still carry and orally transmit a large quantity of traditional knowledge regarding the usage of MP species. To strengthen the current MP value chain, the research explored production and management using an industry-community collaboration strategy [60,74]. At present, More than 25% of allopathic medications originate from plant chemicals, and others are synthetic substitutes based on model molecules found in plant species [72,75]. These species are almost all native to the Himalayan sub-alpine and alpine areas, and in the Indian Himalayas, more than 70% of the therapeutic plants are susceptible to destructive harvesting. Most of the plant species that are employed in the herbal business come from natural sources (more than 90%) [76,77]. More than 80% of population gets their primary health care from MP that are both culturally suitable and inexpensive (WHO 2005) [78]. Most South and East Asian countries employ a traditional system of medicine that comprises thousands of MP species to treat various ailments. There is consistent and strong support in these regions to maintain and promote the valuable traditional medicine, which also has cultural and spiritual importance [5,34,79,80]. Plant-based traditional medicine is used by over 80% of people in poor countries, which mostly consists of plant medications, since it is natural, non-narcotic, and safe to use with few adverse effects. Traditional knowledge systems might help realize the objective of "Health for All" in a manner that is economical. The vast majority of these communities must rely on sources other than allopathic treatment due to the dearth of physicians and hospitals and clinics [72,81]. According to UNSECO (1996), traditional medicine and MP are the foundation of good health in the majority of developing nations. India and China have taken roughly 40% of the world's biodiversity, as well as the availability of

rare plant species, and have emerged as significant medical plant producing nations [82]. According to several United Nations studies, 33% of medicine items in highly industrialized nations are derived straight from higher plants [72,83,84].

Socio-economic importance

Overall, 74% of the population lives in rural areas, with 78% classified as poor and relying primarily on direct exploitation of the environment (water, forests, and fields) for a living (United Nations Development Programme, 2013). For their medical requirements, an estimated 80% of the populations in Africa and Asia rely mostly on these plant-based medications, and the WHO (2008) predicted that in the ensuing decades, a comparable percentage of the global population may likely do so as well [61]. In addition, MP and the area's natural biodiversity are closely intertwined, since the Western Ghats and Himalayas of Indian subcontinent are the world's two richest areas of medicinal and aromatic plants (MAP) biodiversity. The biodiversity in these locations is under danger as a result of several issues, including environmental, socioeconomic, and institutional issues [72]. The use of MAPs in manufacturing is currently a popular issue. The pharmaceutical business, health care products, cosmetics, organic food products, and other industries all employ MAPs [85]. Numerous socioeconomic variables both locally and globally affect the economic worth of MP. India is home to some of the most abundant sources of MAPs, yet farmers there have had limited success in realizing the full potential of these plants because they are unaware of their benefits [85,86]. According to one survey (Tiwari, 2002), the local population in Meghalaya's Khasi area sold over 2800 tonnes of *Cinnamon tamala* for 0.75 million USD every year. However, the public's access to indigenous knowledge, traditional practices, and understanding about these plants is dwindling and, in many cases, disappearing entirely. There are over 8000 different types of MP in India, and almost half of these are higher flowering plant species [82]. Millions of rural populations utilize MP to help themselves [43]. The medicinal herbs in the codified Indian System of Medicine are used by one million or more practitioners and oral streams for therapeutic, preventative, and basic applications. There has been a dramatic increase in the number of plant materials moved both within and between nations in recent years as a result of rising demand for herbal goods. The international trade in medicinal herbs is estimated by the EXIM Bank to be worth US\$60 billion yearly and Unlike India, where the market for herbal medicines generates about 3.5 billion rupees annually and is growing at a rate of 7% annually [42,43,60,87]. India offers a diverse range of wildlife, but the country's expanding population is severely taxing its limited resources. Some MP are becoming more and more endangered in their native habitats as the demand for them rises. The production of MP has to be promoted in order to meet future demands. Indians utilize almost 8000 distinct species of medicinal herbs, according to an ethnobiological survey conducted across the country by the Ministry of Environment and Forests, Government of India [88]. An economic cycle has been proposed as a model for extractive resources. This cycle is affected by a number of factors, such as the availability of wild stocks, development and environmental regulations, socioeconomic features, scientific and technical breakthroughs, migratory tendency, and labor markets [89]. In addition to issues caused by the over use of MP. The need for a comparative analysis of the economic performance of MP production systems is indicated by additional economic issues such as low prices, low profits, income elasticity, the stimulation of the discovery of synthetic substitutes, an unbalanced change in demand, and its lower level of competition in comparison to other economic sectors [90]. Botanical ingredients produced from plants are now widely available on the market in the European Union, with a number of formulations having unique categorizations. They come under one of the following headings: Cosmetics, herbal medicines, nutritional supplements, or medical supplies [91,92]. The majority of Africans utilize traditional herbal treatment in some way and there is a near to US\$ 60 billion annual market for these products worldwide. Many people believe that study into traditional herbal medicine will be crucial for improving world health. Along with India, China, Nigeria, and the

United States of America, traditional herbal remedies have garnered considerable research contributions from the WHO. Millions of dollars have been spent by the pharmaceutical industry and other industries in the quest for novel chemical compounds and potentially MP. When compared to the total pharmaceutical industry, this is still a tiny outlay; yet, it poses significant ethical concerns, of which some are not taken into account in more conventional medication development [93]. MP can help farm households with income-generating activities, offer a “safety net” in the event that other anticipated incomes are not realized, and enhance the rural economy in general by funding health care and subsistence medicine. In addition, rural women have a variety of opportunities to participate in businesses that generate revenue from farming, harvesting MP, and primary processing. Using scientific knowledge and an effective marketing structure, MP farming and appropriate harvesting might be a significant source of additional money for improving the standard of living for rural residents [77]. These uses of MP have the potential to significantly boost the number of rural jobs [74]. Despite the fact that MP research continues to receive a lot of attention in Asia, particularly because of its numerous benefits for poverty reduction and health-care promotion, there is still a lack of scientific data on institutional setups, potentials for various production systems, methods of utilization, commercialization, and contributions to livelihoods [78]. Systematic marketing of different MP and traditional understanding of the herbal therapeutic potential of several significant medicinal herbs, can lead to the establishment of cottage industries that can preserve tribal people’s cultural traditions while also promoting economic upliftment [94-97].

FUTURE PROSPECTIVE

Given that there are around 500,000 plants in the globe and that the majority have not yet been studied for their potential medical benefits, the future of MP is bright. These underutilized resources might have a big impact on how current and future research is handled [98]. Medicinal herbs have been crucial to the advancement of human civilization, such as religions and other rites [99]. Many modern drugs are made from plants that have healing characteristics, and many food crops, like garlic, also have healing benefits. The study of MP contributes to our knowledge of plant toxicity and helps us safeguard both people and animals from environmental poisons. The synthesis of secondary metabolites by plants is what gives them their therapeutic properties. With this in mind, the field of study in natural product chemistry has seen a surge in attention [100]. Therapeutic requirements, the remarkably varied chemical composition and biological functions of secondary metabolites that exist naturally, using fresh natural bioactive substances as biochemical indicators, the creation of new, accurate techniques for identifying naturally occurring compounds with biological activity, improved techniques for isolating, purifying, and structurally characterizing these active constituents, and advanced techniques for characterizing these active constituents are all important [101].

Agro-industrial technologies must be used for the growth, processing, and production of herbal remedies and healing herbs. In acknowledgement of the importance of conventional medicine, the WHO has created rules, guidelines, and standards for botanical remedies. Many contemporary medications are created indirectly from MP, which are sources of novel pharmaceuticals. Research into the claims made about therapeutic plants by tribal healers has become more focused. People will be better educated about effective pharmacological treatment and improved health status after these regional ethnomedical formulations have undergone thorough scientific evaluation and dissemination. Despite the fact that there is a long history of using therapeutic herbs in traditional medicine, scientific investigation and identification of active plant compounds and their results can ultimately result in the development of new natural products and the discovery of novel therapeutic advantages. Furthermore, the process of turning therapeutic plants into drugs, among other things, a practical plan for preserving these resources should be devised.

CONCLUSION

About 75–80% of the world’s population, primarily in impoverished nations, uses herbal medicine for primary healthcare. This is because many believe herbal treatments are safe, affordable, and readily available. The WHO says herbal medicines are two to three times more popular than conventional pharmaceuticals. The use of plants for healing predates human history and inspired much contemporary medicine. Historically, most successful medications were plant-based. Aspirin (willow bark), dioxin (foxglove), quinine (cinchona bark), and morphine (from the opium poppy). In ancient times, people utilized plants to treat the sick. Allopathy rose alongside the industrial revolution. Herbal medication was effective but less popular.

Herbal medications were abandoned by conventional medicine in the mid-20th century, not because they were unsuccessful but because they weren’t as profitable as synthetic pharmaceuticals. MP contribute to development by providing healthcare and revenue. Supplying botanicals and herbals is a flourishing business, despite the need for strong proof of herbal effectiveness.

Even industrialized countries employ herbal medications and treatments. Global demand for plant-based goods has risen. Herbal supplements and cures are expected to fuel future demand. Scientists, physicians, and pharmaceutical corporations will seek to China, India, etc., for their needs, since they have the most MP species and are the leading exporters.

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AUTHORS CONTRIBUTIONS

Rajat Nath and Sibashish Kityania: Collection of data, Writing- original draft. Deepa Nath: Writing-review and editing. Anupam Das Talukdar and Gadapani Sarma: Conceptualization, Methodology, Formal analysis, Writingoriginal draft, Supervision, Writing-review and editing.

CONFLICT OF INTEREST

The authors declared that they have no conflict of interest.

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