iMedPub Journal www.imedpub.com

American Journal of Phytomedicine and Clinical Therapeutics

ISSN 2321-2748

2023

Vol.11 No.4:186

Future Prospect of Herbal Medicine: Opportunity, Challenges and Role of Bangladesh

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Received: September 21, 2022, Manuscript No. IPAPCT-23-14597; **Editor assigned:** September 26, 2022, PreQC No. IPAPCT-23-14597 (PQ); **Reviewed:** October 10, 2022, QC No. IPAPCT-23-14597; **Revised:** March 30, 2023, Manuscript No. IPAPCT-23-14597 (R); **Published:** April 27, 2023, DOI: 10.36648/2321-2748.11.4.186

Citation: Sala Uddin GM, Hossain HM, Aziz AM, Al Din SMS (2023) Future Prospect of Herbal Medicine: Opportunity, Challenges, and Role of Bangladesh. Am J Phytomed Clin Ther Vol.11 No.4: 186.

Abstract

Introduction: The use of herbal medicine increased worldwide. In Bangladesh, herbal medicine is not well documented though this medicine playing important role in the alternative health cares system. Due to forest diversity and traditional knowledge, Bangladesh has the potential to accept the challenge to meet local and global demands. In this review, we summarized the opportunity, challenges and role of Bangladesh to meet the local and global demand.

Methods: A systemic literature search was performed by combining variations of search terms and the main findings were extracted from the eligible article. The manuscript was written according to our study design and information collected from the article.

Results: From the study, it has been seen that Bangladesh have a great opportunity to uphold herbal medicine in both national and international market. Major challenges are associated with research and development, formulation, production, and regulation. Loss of biodiversity, industrialization, biopiracy, unscientific use, together with lack of education and infrastructure development are the weaknesses of the growth. Rigorous research is needed in agro-farming, plant-biotechnology and the pharmaceutical sector to increase the production of medicinal plants as well as their active medicinal ingredients. Conservation of biodiversity, documentation of traditional knowledge, and quality control will be prominent roles in the sustainability of this type of medicine in the 21st century.

Conclusion: This study revealed that besides research and development, conscious efforts are needed by the national governing board with public and private sector involvement which will increase the productivity and flourish the national economy of Bangladesh.

Keywords: Herbal medicine; Ayurveda; Unani; National economy; Traditional knowledge

Introduction

Science prehistoric times' herbs have been used as food, flavonoid, fragrance, and also some spiritual activities. It also has been used to treat and prevent some diseases along with pandemics. Even herbs also provide all for the survival of humans and other life on the planet and well-being [1]. However, according to the World Health Organization (WHO), herbal medicine is the whole knowledge, skill, and practices based on the theories and experiences indigenous to different cultures and used in the maintenance of health as well as in the prevention, diagnosis, improvements. treatment and management of physical and emotional health. Historically herbal medicine meets the therapeutic expenses of many previous generations and has a deep tradition of its application outside of conventional medicine. It also remains of ongoing importance because about sixty percent of the world population depends on herbal medicine for their primary health care needs and among them 80% of the population are in developing countries [2]. Simultaneously, the introduction, development, analysis and application of herbal medicine have risen dramatically in the last decade. Globally studies are ongoing to verify their efficacy and some of the results have led to the production of plant-based medicines [3]. Interestingly it is always believed that all-natural herbs and their related products are safe, cheaper, and usually obtainable which increases the acceptance and suitability of herbal medicine [4]. However, there are some concerns about herbal medicine because of inappropriate knowledge of the mode of action, potential adverse reaction, the contradiction of active agents, and interaction of existing orthodox pharmaceuticals and functional foods, etc [5].

In recent decades, due to the acceptability of medicinal plants as safe remedies by a greater number of people and approaches to prevent and/or remedy diseases to increase their importance in the mainstream healthcare system. Therefore, the demand for herbal medicine, health products, pharmaceuticals, food supplements, cosmetics, etc. is increasing internationally due to having acknowledgment of these products as mainly non-

hazardous, fewer side effects and better compatibility with physiological flora, available and affordable price [6]. Generally, herbs are considered rich sources of phytochemical compounds that are integral components of the traditional and alternative healthcare systems. People have been using plants as medicine from prehistoric times. The prediction of the time and place for the first uses of plants as medicine is still controversial but according to the US forest service plants have been used as medicine since 60,000 years ago. About 2700 BC Chinese started to use herbs as medicine in a more scientific sense and about 3500 BC Egyptians recorded their knowledge of illnesses and cures on temple walls which contain over 700 medicinal formulas. Later herbal medicine has been used and documented in India, Roman, Greek, etc. It has also been practiced and documented in North America, Arabic countries, and Japan [7]. The first book and transcript of ayurveda or herbal medicinal system in Bangladesh are yet unknown but there are a number of tribes or indigenous people living here. These tribes, because of their habitats in forests over the centuries, accumulated a vast amount of information on the therapeutic properties of numerous plant species [8]. Bangladesh has a very rich source of biodiversity and possesses more than 500 therapeutic plant species [9] but there is no actual figure of how many healing plants are available here. The forests of Bangladesh are the main source of a large number of medicinal plants [10]. Primary sources of the use of medicinal plants, research, isolation of bioactive constituents, and pharmaceutical ingredients can help us to find new therapeutically active drugs. It has been estimated that about 5000 plant species (nearly 2.2% of the global species) occur in Bangladesh among them about 2500 species of both higher and lower plants group are of medicinal value. With its rich source of herbs and cultivation fatalities, Bangladesh is one of the inceptions of an herbal revolution and is able to stock and supply medicinal plant resources to meet the swelling global demand. Herbal plants are not only important to the primary healthcare system but also vital to boost the economy and can impart an important part in monetary expansions. In Bangladesh, many medicinal plants have reached the fate of destruction owing to overpopulation, deforestation, and changes in land-use patterns [11]. Therefore, the preservation of biodiversity and its sustainable use can help to build a healthcare system, and create a greater economic society and Bangladesh can play a crucial role in this aspect.

Literature Review

Present scenario in Bangladesh

In Bangladesh, the use of herbal medicines is not well documented but traditional healing is widely practiced in the rural area, especially among people with low socioeconomic status and this scenario has enlarged through the progression of current medicinal knowledge [12]. The major medicinal plant production zones in Bangladesh are Mymensingh, Tangail, Chittagong, Hill tracts, Kushtia, and Sylhet. The use of herb and herbal products is also cycled from farmer to end user *via* kabiraj, pharmaceutical industry, and wholesale traders. About 70%-75% of Bangladeshi people use traditional medicine for their primary health maintenance [13]. The alternative system of health, Kabiraji, Homeopathic, Ayurveda, Unani, and Home medicine plays a crucial role in the health care system of

Bangladesh. It seems to be that nearly 650 plant species have been identified here and 20% of plants have elevated medicinal importance [14]. Another study revealed that 21000 medicinal plants listed worldwide are used for medicinal purposes, among these, 2500 species are in Bangladesh, and almost 190 species are commercially used on a fairly large scale [15]. How many practitioners of the traditional and alternative health care system in Bangladesh used herbal medicine/medicinal plants in their daily practice, promotional, and curative applications are not clear yet. However, a study showed that there are over 87,000 villages here and most villages have one or two practicing Kavirajes who used medicinal plants for various formulations to treat the ailment [16]. According to the Bangladesh Association of Pharmaceutical Industries (BAPI), and the Director-General of Drag Administration (DGDA) there are 2400 registered Homeopathic, 6389 Unani, and 4025 Ayurvedic drugs available. There are about one government and seven private Ayurveda colleges offering diplomas in Ayurveda here. About 153 Ayurveda doctors registered by Bachelor of Ayurvedic Medicine and Surgery (BAMS) and 398 diploma holders practicing herbal medicine for their service in alternative healthcare systems.

Since the Asian subcontinent, Bangladesh is well known for its traditional knowledge and diversity of forests that have a variability of therapeutic herbs. Therefore, there is an urgent need to preserve these from both the national and international perspectives to benefit humankind. Not only for health care, but the trade of medicinal plants is also an important alternative income-generating source for poor communities.

Importance of herbal medicine

The use of plants and products from its parts to treat diseases and enhance general wealth and wellbeing is known as herbal medicine. The advantage of this type of medicine is it can interact with other pharmaceutical medications and should be taken with care. It has two types of importance, like health and its trade and value. The major use of herbal medicine is for health promotion and therapy for chronic conditions. When conventional medicine is ineffective in the treatment of diseases the use of traditional remedies increases, for example, in advanced cancer and in the face of new infection diseases [17]. Therefore, this medicine has greater economic value in the world, and its needs increase day by day. According to World health organization estimation, 70% of the global population relies on herbal remedies for their primary health care needs. Even in developed countries, herbs and their related products gaining more popularity and are being developed. A report revealed by the University of Texas is that about 49% of adults tried remedies to plants and 24% of people considered themselves for the use of herbal products. Americans spend 34 billion annually on alternative medicine. In China, 40% of all healthcare needs are filled up by herbal medicine, and annually about 200 million patients are trying the use of herbal medicine for their health care. Moreover, the percentage of the population which has used herbal medicine in Australia, Canada, USA, Belgium, and France is estimated at 48%, 70%, 42%, 38%, and 75%, respectively [18]. The United Kingdom imports about 90% of its medical herb and for this requirement, they spend

about 139 million euros. The global market of herbal medicine expanding day by day. In Bangladesh, plants are major components in traditional ethno medicine and around 80% of the population used herbal medicine for their primary healthcare. The major global markets for therapeutic and aromatic plants are associated with France, China, Germany, Italy, Japan, Spain, the UK, and the USA.

Challenges of herbal medicine

The use of herbal medicine increase day by day. But sometimes traditional medicine is introduced into the market without any mandatory safety and toxicological evaluation regarding the effectiveness of the drug. Although researches are ongoing in several kingdoms for effectiveness, safety, and regulatory affair. However, the challenges related to the herbal drug are almost the same all over the globe with few differences from country to country. For example, many countries have lacked sophisticated equipment to control manufacturing exercises and quality standards but they have enough plant resources to prepare herbal products. Challenges that are common to many countries and often encountered are as follows

Regulatory status: The consideration and categorization or even definition of herbal medicine varies from country to country. A single medicinal plant or supplement may be recognized as food, a dietary supplement, or herbal medicine in different countries. This matter announces thoughtful trouble in the definition and perception of herbal medicine. It also creates nationwide regulatory challenges and confuses patients and consumers at the same time.

Assessment of safety and efficacy: The safety and efficacy, research protocols, standardization, and method for evaluation of herbal medicine are much more complex than those required for traditional and orthodox pharmaceuticals and no one can contradict this fact. Sometimes a single herbal medicine contains more than a hundred natural constituents or mixed herbs. In such a case analysis of a single active ingredient may be particularly impossible especially when an herbal product is a mixture of two or more herbs [19]. Therefore, contamination, misidentification of plants, defective gathering and preparation, inappropriate formulation process, storage, gross substitution with plant material, and substitution with exhausted drugs, reduce the effectiveness and these factors affect the quality and efficacy of herbal medicine [20-22].

Quality control and safety monitoring: The use of herbal medicine increased for the management of diseases including prevention, diagnosis, and treatment at the same time it creating global health challenges in terms of quality, safety, and efficacy. Therefore, its quality control and proper management worldwide are still a big challenge. Besides scientific validation and technological standardization are needed for worldwide acceptance and future advancement to meet the global challenges. In the meantime, regulation and legislation of herbal drugs and/or supplements have been indorsed in very few countries, even though, most countries do not have any proper regulation, and the quality of this type of product sold is generally not guaranteed. WHO also provides their guideline for safety monitoring and reporting system is also available in another document published in the year 2000 [23]. Interestingly, there are many factors that influence the quality and safety of herbal medicine which can be from the cultivation to the final products. It can be categorized into external and internal issues. External quality challenges mainly include contamination by other materials (e.g., heavy metal, pesticide, microbes, mycotoxin, and other foreign matter like ash, adjuvant or organic solvents, etc.), adulteration, and misidentification. The internal challenge includes complex phytochemicals and nonuniform ingredients [24-27].

Research and development: Research of herbal medicine can be defined as the careful study of herbs and their supplements to discover new facts and general information about it and the development include research, quality control, efficacy, clinical study, and scientific analysis, source of raw materials, preservation methods, processing, packaging processing, application, and distribution. Moreover, practitioners are often comfortable with the application of such medicines having good results experienced with patients. In addition, the scientific validity of herbal drugs and their supplements in research and development is still often questioned due to the application of analogous methodologies across different medicinal products and the lack of quality control and product standardization [28]. So research and developments in herbal medicine are a great challenge.

Other challenges: Including the above challenges, herbal medicine undergoes complications with processing and harvesting, infrastructure, clinical fragile, Intellectual Property Rights (IPR) and biopiracy, irrational use, impediments of application, lack of regulation and controlling authority, etc.

Opportunity

Besides challenges, there are lots of opportunities for herbs and their related products in the future, because of their increasing demand and fast-growing market in both emerging and industrialized nations in the world [29]. The acceptance of plant-derived health care products and their use in the cosmetics industries are increasing gradually. Moreover, over three-quarters of the world's population relies mainly on plants and plant extract for health care. It is projected that the market price of herbal medicine was USD 98.60 billion in 2020 and is estimated to reach USD 391.22 billion by 2028, growing at a Compound Annual Growth Rate (CAGR) of 18.8% from 2021 to 2028. Therefore, herbs or medicinal plants will make an important contribution to the large economic development process [30]. The therapeutic potential of many herbs is yet to be fully discovered. Therefore, there are many clinical and research opportunities to find out new approaches and bioactive compounds from plants. For example, research published about the bioinformatics approach can be implemented for the identification and study of active ingredients from medicinal herbs [31]. Generally, most of the therapeutic plants are wild-type and found in less developed and far-flung rural areas. Therefore, it's farming by in vitro culture and micro propagation is another opportunity for small and industrial-scale production. This will not only produce

opportunities for new research but will also create opportunities for entrepreneurship [32]. Besides cultivation, a substantial amount of foreign exchange can be earned by exporting medicinal plants to other countries. A study revealed that for the fourteen-year period the global export of medicinal plants was USD 1.92 billion which was estimated as 601357 tons per annum and increased by 3.60 billion USD projected to 702,813 tons in 2014 [33]. According to the central government of India, the remedial plants have grown 33.2 percent during the year 2020-2021. In addition, herbal medicine is being taught more in medical schools and pharmacy schools. So opportunities also exist in the teaching profession. Carrier openings in drug manufacturing companies, plant monographs, drug inspections, clinical trials, and the various newer fields e.g. molecular biology, nanotechnology, etc. Through daily news Med Page Today doctors do not know much more about complementary and alternative medicine than their patients do. Moreover, by an online survey, it was also seen that most healthcare professionals said that their profession was just as poorly informed about herbal remedies. So, there is a great opportunity to know about herbal medicine for medical taxonomists, herbalists pharmacologists, and chiropractors, ayush practitioners, and doctors.

Discussion

Initiative needs to Bangladesh

In Bangladesh, forests and natural ecosystems are the major sources of herbal plants (about 90%) which are being used as raw materials by around 600 medium and small-scale industries to produce alternative and local medicine [34]. Degradation of biodiversity, aggressive modernization, and industrialization will decrease the reservation of herbs here. Therefore, rigorous research is important in agro farming, plant-biotechnology, and the pharmaceutical sector to increase the manufacture of curative plants and their active medicinal ingredients by using modern genomics and biotechnological methods. There are many universities present in Bangladesh but research in this sector is insufficient and comparatively less than in Europe, Japan, China, and even India. Therefore, Bangladesh forest research institute, agriculture university, and medicinal and pharmaceutical colleges should encourage them to undertake such a basic research venture. In Bangladesh, lots of people use herbal medicine with traditional knowledge from their ancestor in regard to vegetation and medication which cause a shortage of trained people in the part of herbal/flock medicine. Therefore, proper documentation of traditional information, patenting, and research on local plants are necessary for the sustainable development of Bangladeshi herbal medicine. Bangladesh ministry of forest publishes its national conservation strategies for 2016-2031 for the expansion of woodlands in the country through the conservation, development, and enhancement of natural resources. Thus, it's should necessary to take policy, strategies, and preservation of therapeutic plants presenting the view that our ancient and holistic medicinal systems can make a difference towards better healthcare. Besides, it is also necessary to undertake various programs/ schemes to alert people about necessary local herbs and

conservation of rare, endangered, and threatened plant species for the progress and justifiable administration of herbal plants. The government of Bangladesh can take initiatives the listing herbal medicine produced by the local practitioner and industries present here to market it by evaluating its safety and efficacy. Adulteration and bio-piracy are a matter of concern here which is a serious threat to local healthcare supplements and this issue can prevent its worldwide progress. To solve the problem government of Bangladesh can create a separate website by a regulatory body under the authority of the Directorate General of Drug Administration (DGDA) of Bangladesh which mentions all information on national herbal medicine and its related products. It has also been seen that there is an enormous gap between developed and developing nations such as Bangladesh on patenting the products [35]. So effective herbal medicine and its related products can be patented at the national and international level to increase our market value by demanding the products.

Role of Bangladesh

In order to flourish, and promise a bright future the requirement for alternative healthcare products and its growth will continue. Recently along with modern medicine, the practice of traditional medicine has flourished tremendously in Bangladesh. Therefore, for a sustainable global market, our valuable plants and their related products along with ethnobotanical exploration can be projected and need to continue the awareness about the consumption of home medicine and industrial use [36,37]. However potential growth of medicinal plants is important for Bangladeshi economic growth. To continue the growth its quality assurance should be guaranteed and should be the prime focus so that customers in any nation of the world can trust and buy pure products. Medicinal plants and their related products are better and costeffective treatments for the world community and their growth also provides a new way for traditional flock medicine. In South Asia, medicinal herbs used as medicines accounted for nearly 1/3rd of market demand from the region. Alertness about the dwindling supply of the world's medicinal plants has being delayed in order to the global mandate of herbal supplements. In the meantime, Bangladesh could not create a valuable position in the traditional medicine market in the world although the climatic condition is favorable for the growth and farming of herbal plants. To upgrade in this situation, we now urgently need to increase plant cultivation, integrate modern knowledge with traditional knowledge, increase research facilities for more production and preservation, focus on the local arts of alternative medicine and its supplements by governing bodies like the board of Unani and ayurvedic medicine of Bangladesh and/or herbal product development council, etc. Many drugs have been discovered from plants, and were chemically synthesized by pharmaceutical industries; therefore, isolation and identification of therapeutically safe active ingredients from plant materials and their subsequent chemical synthesis would be helpful to the sustainability of the plants that are extensively harvested and quickly disappearing from Bangladesh. Cultivation of commercially expensive therapeutic plants can be a significant source of income in urban

areas. For example, the cultivation of several medicinal plants in the East-West area of Bangladesh has changed the socioeconomic status of the rural people [38]. Therefore, the government of Bangladesh should encourage local people to cultivate medicinal plants to deliver a steady supply, which will be useful for improving economic sustainability by creating new jobs and employment in the local areas [39].

Conclusion

To increase the potential in this area, realistic policies with an economic outlook and active forecasting strategies are required. The proper cultivation, research, and successful formulation, training, and advertisement will increase the acceptance of herbal treatment which will ensure their successful integration into the public health framework is essential in this modern age. Conservation of biodiversity and protection of biopyresi and adulteration is other issues for the growth and development of herbal medicine. Sensible efforts need to be made for proper identification of active ingredients and documentation of available traditional knowledge on our precious plant resources through detailed phytochemical, besides the biological and pharmacological investigation is required for better placement in the global market.

Acknowledgment

We gratefully acknowledge Dr. Md Monirul Islam for his efforts in proofreading this paper.

Authors' Contribution

All authors certify that they have participated sufficiently in this work, including participation in the study, download, read and extraction, and writing of the article and also take responsibility for the content of the article.

Ethical Approval

This study did not warrant institutional review board review as no human subjects were involved.

Competing Interests

The authors declare that there is no conflict of interests regarding the publication of this paper.

Funding Information

The author(s) received no financial support for the review, authorship, and/or publication of this article.

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