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Review Article

A Systematic Review on Bioactive Metabolites in Pharmaceutical Industry

Tanmoy Satpati* and Snigdha Samanta

Assistant Professor, School of Agriculture and Allied Science, The Neotia University, West Bengal

*Corresponding Author E-mail: tanmoysatpati22@gmail.com

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ABSTRACT

The function of bioactive metabolites in the pharmaceutical sector is investigated in this systematic review. Compounds produced by living things known as "bioactive metabolites" have pharmacological qualities, making them useful sources for the discovery and development of new drugs. The review focuses on where bioactive metabolites come from, how they are isolated and identified, and how they might be used in medications. The paper also looks at the difficulties in finding and developing bioactive metabolites, including the lack of availability, the poor yield, and the necessity for environmentally friendly manufacturing techniques. Overall, this review emphasises the significance of bioactive metabolites in the discovery and development of drugs and offers information on the state of this field's research. The current review papers deal with the role of different bioactive metabolites and their uses in the pharmaceutical industry.

Keywords: *Medicinal plants, herbal drug, pharmaceutical role, economic value, primary and secondary metabolites.*

INTRODUCTION

Bioactive Metabolites:

Natural phenomena are always a good indicator of the main aspects of cohabitation. The foundation for treating human illnesses is natural products made from plants, animals, and minerals (Jamshidi-Kia et al., 2018). Humans have always depended on nature to meet their basic requirements, including those for food, shelter, clothing, fertilizer, and transportation (Dar et al., 2017). As a result of climate change and poor human lives, humans are becoming more susceptible to illnesses and diseases. High temperatures, humidity, and other environmental factors encourage the growth of microorganisms and disrupt their symbiotic relationship with hosts, leading to an increase in infectious diseases such as influenza, TB, meningitis, endocarditis, and other ailments (Ahmad, 2021b).

The development of a new antibiotic composition is required by microbial resistance, which calls for more thorough research and takes time. As synthetic medicines become more hazardous and antibiotic resistance rises, interest in ethnopharmacology is growing.

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The vast majority of people around the world presently receive their treatment mostly from medicinal plants, which have been used in traditional healthcare systems since prehistoric times (Uprety et al., 2012). Numerous phytocompounds made from medicinal plants are safer and carry little to no risk. According to Faridi et al. (2012), phytomedicines are secondary bioactive plant metabolites.

These plant chemicals serve as natural remedies. Pharmaceuticals can be made from plant fragments or whole plants as well as isolated active metabolites (both whole and various plant parts, as well as plant-derived bioactive metabolites, can be used to generate drugs). Worldwide, medicinal plants are used by millions of people to improve their basic health, generate income, and sustain their way of life (Ranilla et al., 2010). More than 80% of people worldwide, according to data from the WHO, depend on prescription medications, placing a huge socioeconomic burden on health care (WHO, 2013).

In Pakistan, Sri Lanka, China, India, Japan, Pakistan, and Thailand, traditional medicine is widely practised. About 40% of China's total medicinal consumption is made up of traditional tribal cures (Ahmad, 2021a). Plants make important contributions to a variety of industries, such as fine chemicals, cosmetics, pharmaceuticals, industrial raw materials, and so forth. Medical plants are vital in the search for new medications (Ahmad, 2021c). It has been demonstrated that medicinal herbs are the only effective treatment for several fatal illnesses, including cancer and viral infections like hepatitis, AIDS, and others.

Regular scientific research has highlighted the importance and contribution of many plant families, including Asteraceae, Apocynaceae, Liliaceae, Rutaceae, Caesalpiniaceae, Solanaceae, Piperaceae, Ranunculaceae, Apiaceae, Sapotaceae, etc., and their bioactive components in the therapeutic arena, thus establishing a very imperative part of natural wealth (Kumar et al., 2017).

The value of Perilla frutescens in terms of several nutrients and phytopharmacology has been thor**oughly examined by Ahmad et al.** 2022. To test for antibacterial capabilities, several bioactive metabolites have been isolated from several medicinal plants (Ahmad et al., 2022).

Table 01: Comprehensive information on important medicinal plants

Plant Name	Common Name	Family	Parts used	Chemical constituents	Secondary metabolites	Therapeutic use	References
Chlorophytum borivilianum	Safed musli	Liliaceae	Root	25 alkaloids, vitamins, proteins, carbohydrates, steroids, saponins, potassium, calcium, magnesium, phenol, resins, mucilage, and polysaccharides	Stigmasterol and hecogenin	Aphrodisiac agent and revitalizer, as general sex tonic remedy for diabetes, arthritis and increasing body immunity	Ahmad et al., 2021
Chlorophytum borivilianum	Safed musli	Liliaceae	Root	carbohydrates, steroids, saponins, potassium, calcium, magnesium, phenol, resins, mucilage, and polysaccharides	Flavonoids, Saponin etc	Aphrodisiac agent and revitalizer, as general sex tonic remedy for diabetes, arthritis and increasing body immunity	Ahmad et al., 2021c
Perilla frutescens	Beefsteak plant	*Lamiaceae*	Leaf, stem, and seed	Apigenin, ascorbic-acid, beta-carotene, caffeic-acid, citral, dillapiol, elemicin, limonene, luteolin, myristicin, perillaldehyde, perilla ketone	Terpenes, phenylpropanoids, polyketides, and alkaloids.	Depression, anxiety, asthma, chest stuffiness, vomiting, coughs, colds, flu, phlegm, tumors, allergies, intoxication, fever, headache, stuffy nose, constipation, abdominal pain, and indigestion	Ahmad et al., 2022a

a. *Perilla frutescens* b. *Chlorophytum borivilianum*

Figure 01: Images of important medicinal plants

CONCLUSION

Conservation is the process of managing the biosphere in order to maximise the benefit to the current generation while preserving the potential for the future. Medicinal plant-based livelihood systems are frequently mediated by market demand and provide an excellent source of employment and income to disadvantaged rural populations. Developing an adequate framework and technology for medicinal plant production is crucial to ensuring a continuous and consistent supply of medicinal plants for the pharmaceutical sector and halting the deterioration of the natural resource base. Herbal pharmaceuticals or plant drugs are medicines that comprise a chemical molecule or, more commonly, a mixture of chemical compounds originating from plants that operate on the human body individually or in combination to prevent disease and maintain or restore health. Some medicinal plants are used as adjuvant therapy in healthcare systems across the world, not only to treat diseases but also to prevent them and preserve health. The value of medicinal plant research is realized now more than ever. Extensive study is necessary to regulate the quality of raw medications and formulations in order to justify their usage in the contemporary medicine system; following that, animal studies and clinical trials are required to utilize the advantages of these plants. Furthermore, in the creation of medicine from medicinal plants, among other things, a practical plan for preserving these resources should be devised. Table 1 and Figure 1 provide comprehensive information. Ahmad reviewed how food is employed today as a vaccine and its usage in the treatment of cancer and COVID-19 (Ahmad, 2023a).

There is a growing understanding that a green recovery is required to address the pressing issues of climate change and biodiversity loss while the world recovers from the COVID-19 epidemic. In this attempt, computational and molecular biology can be extremely important. We can create fresh approaches to lower carbon emissions, increase renewable energy, and safeguard ecosystems by using the potential of molecular biology and modern computing technology. For instance, molecular biology can be used to create novel strategies for absorbing and storing carbon, while computational modelling can assist us in optimising the design and operation of renewable energy systems. Additionally, by combining computational and molecular approaches, we can better understand the intricate connections that exist between living things and their environments, opening the door to more sustainable land management techniques. To ensure that the knowledge and resources of the computational and molecular biology communities are adequately utilised in support of a green recovery, a call to action is required (Ahmad, 2023b).

Declarations:

Ethics approval and consent: This study has nothing to do with human and animal testing.

Consent for Publication: All the authors give their consent to publish the current manuscript.

Competing Interest: The authors declare that they have no conflict of interest.

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