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EDITORIAL

Exploring natural products: Novel insights and therapeutic potential of plant-based compounds

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Natural products, derived from plants, animals, and microorganisms, are compounds that have been used for centuries in traditional medicine and are now increasingly recognized for their therapeutic potential. These substances, which include a wide array of bioactive molecules such as alkaloids, flavonoids, and terpenoids, offer a rich source of novel treatments for various diseases. Their diverse mechanisms of action and safety profiles make them valuable in developing new pharmaceuticals and nutraceuticals. As research advances, natural products continue to play a pivotal role in drug discovery, offering innovative ways to address health challenges and improve well-being.[1,2]

A diet based on natural products and plants has long been a fundamental source of both nourishment and medicine for humanity. While plant-based foods are a staple for nutritional support, many people worldwide also turn to botanical remedies to address their health needs, whether through traditional practices or complementary and alternative medicine. Today, there is a global resurgence in the interest and use of plant-based therapies and botanical health products. This renewed enthusiasm for herbal medicine has prompted increased scientific investigations into the pharmacologically active compounds found in medicinal plants, deepening our understanding of their potential health benefits.[1,2]

Wild edible plants, rich in secondary metabolites such as polyphenols and terpenoids, are excellent candidates for use in nutraceuticals and functional foods. For instance, the Mediterranean region is celebrated for its diverse array of wild edible plants, which are integral to the local diet. These plants have long been recognized by local communities for their nutritional, protective, and medicinal benefits, well before these advantages were scientifically proven. In the eastern Mediterranean region, wild edible plants remain highly valued as sources of healthy food and are frequently harvested by women in rural areas, providing both sustenance and a source of income in economically constrained regions.[3,4]

A diet rich in medicinal plants supports balanced immune function, which is crucial for defending the body against microbial invaders. Immunomodulators, which can either enhance or suppress the immune response, play a critical role in this process. Plant-based secondary metabolites have shown significant potential as natural immunomodulators, offering a promising alternative to conventional immunosuppressants and immunostimulant drugs that often elicit severe side effects. Many plant species exhibit strong immunomodulating properties due to their ability to interact with the immune

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system through various mechanisms and molecular targets. Phytochemicals such as alkaloids, flavonoids, terpenoids, carbohydrates, and polyphenols are particularly noted for their immunomodulatory effects in numerous medicinal plants. Many edible plants are important sources of antimicrobial compounds exhibiting high activity against both Gram-positive and Gram-negative bacteria. Cultivated vegetables, fruits, nuts, herbs, and spices have been investigated more thoroughly than wild species; thus, they dominate the list. Although more than 7000 species of wild edible plants are encompassed in human diets, their immunomodulatory properties are poorly investigated, and most of them still need to be studied.[3]

Recent advancements in medicine and molecular biotechnology have significantly improved the containment and, in some cases, eradication of certain pathogens, particularly in developed countries. Nonetheless, the emergence of evolving pathogens has given rise to new infectious diseases. Technological and socioeconomic changes have accelerated global movement, further facilitating the spread of these diseases, as evidenced by the rapid global dissemination of the 2009 influenza pandemic and the 2014 Ebola outbreak.[5]

In this context, natural products from plants are emerging as promising candidates for next-generation antibacterial and antiviral agents. In developed countries, where 80% of the population depends on traditional medicine for primary health care, and in countries such as India, renowned for its extensive collection of medicinal herbs, the potential of plant-based treatments for bacterial and viral diseases is substantial. In this regard, Mediterranean wild edible plants and their antimicrobial properties have been known since ancient times, and rediscovering them as natural remedies for common infections is gaining traction in modern times. Current strategies for combating bacterial infections heavily rely on antibiotics and preservatives, which often have limited efficacy and can cause serious side effects. This underscores the urgent need for novel antimicrobial agents and food preservatives with enhanced efficacy and reduced toxicity.[6]

Recent years have seen a surge in research on herbal medicines worldwide, with both developed and developing nations intensifying efforts to scientifically assess and validate these treatments through rigorous clinical trials. This special issue aims to compile original research articles that investigate the efficacy of active constituents or extracts from natural products in preventing and treating microbiological, immunological, and infectious diseases. We also welcome review articles that offer comprehensive insights into the current state of research in this field. Some of the highlights of this special issue include:

(1) Evidence-based herbal medicine and natural products are used for the prevention and management of microbiological, immunological, and infectious diseases
(2) Pharmaceutical formulations of pharmacologically active metabolites in managing chronic, microbiological, immunological, and infectious diseases
(3) Different pharmacologically active metabolites are used in the management of human microbiological, and immunological diseases
(4) Recent advances in the discovery of natural drugs for addressing microbiological, immunological, and infectious diseases
(5) Compounds from the Mediterranean diet and medicinal plants.

Conflict of interest

The author declares that he has no competing interests.

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