



Therapeutic Roles of Phytochemicals for Human Health

Sandip Paul

Department of Chemistry, The Bhawanipur Education Society College, Kolkata 700020, West Bengal

Abstract

Bioactive constituents that sustain or advance wellbeing and are observed in the nexus of the foodstuff and pharmaceutical sectors are known as phytochemicals, and they are significant in the field of nutraceuticals. These products could include drinks, processed foods, herbal products, specific diets, and separated nutrients. Designer foods with genetic modifications might also be among them. Among the most prevalent phytochemicals contain phytoestrogens, terpenoids, carotenoids, polyphenols, flavonoids, isoflavonoids, and other compounds. These phytochemicals, either by themselves or in combination, have high therapeutic potential for treating a variety of disorders. According to health claims, functional foods, and the existence of specific phytochemicals, the corresponding health benefits are supported by science and ethics. Pharmacologically, they have different effects on human health, such as anti-inflammatory, antioxidant, antibacterial, antispasmodic, hepatoprotective, neuroprotective, anti-aging, DNA damage, cancer, heart disease prevention and various other diseases also.

Keywords: Phytoconstituents, Human health, Medicinal plants, Herbal medicines.

Introduction

Herbs have always been regarded as the most significant source of medicine for treating diseases. The basic pharmaceuticals were sourced from marine, terrestrial, and plant sources. Plants have been a more significant source of pharmaceuticals than marine and animal sources since the 20th century. Herbal medications have seen the most increase in both developing and developed nations due to their availability, effectiveness, and minimal side effects [1]. The primary source of medicine since the beginning of human civilisation has been plants. Approximately one-third of the medicines come from plant sources, along with certain fungi, bacteria, and organic debris. Over 60% of all medications worldwide, both in the conventional and modern systems of medicine, are plant-based. Medicinal herbs are a gift from nature to help people live healthier lives. Humans are protected from a number of diseases by a number of curative floras and their phytoconstituents, which are widely distributed in environment. India is the world's largest producer of herbal medicine, and medicinal plants are widely available there. One of the most crucial aspects of herbal medicine is that it may be found in environment and some of the

* Correspondent Author: email: sandip.paul@thebges.edu.in (S. Paul)

plants can be grown in nurseries and botanical gardens for easier environmental control and access to a greater variety of medications. Instead of using dangerous chemical reactions to create things, plants offer effective, economical health care. The availability of phytoconstituents and their derivatives in various plant parts, such as bark, fruits, seeds, rhizomes, roots, and leaves, as well as the existence of a multiple of different phytochemicals, such as alkaloids, flavonoids and others, which are important in the treatment of various diseases, are their main advantages.

Traditional Indian medicine utilised a variety of different therapeutic herbs in its herbal preparations [2]. Most doctors in traditional Indian medicine used to recommend and administer their own herbal preparations. According to the World Health Organization (WHO), almost 21,000 plants were employed as medicines to treat various diseases worldwide [3]. In India, there are close to 2500 different types of herbs, of which 150 are widely used commercially. India produces the most herbal medications globally, earning it the nickname the botanical garden of the world [4]. Alkaloids, tannins, glycosides, steroids, and other chemical groups that may play a significant medicinal function as anticancer, antidiabetic, antihypertensive, lipid-lowering, antibacterial, and antimalarial medicines can all be found in plants. Some plant-derived colours, essential oils, lattices tannins, and vegetable oils are also frequently utilised as potent medications in herbal formulations. Only a small part of the approximately 30,000 species of higher medicinal plants have been identified to have therapeutic characteristics, and an even smaller portion of those species produced more specific medications, as a result, little is known about the components of plants. Only 10 to 14 percent of the organic components of the herbs under examination are said to be known and the remaining 86 to 90 percent still to be investigated.

Many people today struggle with health-related issues, such as obesity, diabetes, cancer, hypertension, and other conditions. The traditional treatment for these illnesses entails the use of potentially harmful synthetic medications and surgical diagnosis, both of which have numerous difficulties and detrimental aftereffect. It has been demonstrated that healthcare with herbs items are secure and have fewer negative effects than synthetic medications. Because they can be easily obtained from the environmental basis and do not require any risky synthetic procedures for their extraction, natural product-based medications and herbal-based polymers are harmless in terms of preparation [5]. For the creation of synthetic medication, it was necessary to use potentially harmful organic solvents and reagents [6].

Herbal medications have a variety of effective properties, including anti-inflammatory, antibacterial, laxative, demulcent, anticancer, antitussive, and carminative ones. Herbal remedies have a longer-lasting effect than synthetic drugs since they target the disease's underlying cause. The risky synthetic method is used to create synthetic pharmaceuticals, which are typically made of a single, pure component. We can thus assume that herbal medication is more effective than traditional synthetic treatment [7]. The cost of therapy is also minimal because medicinal plants are readily available everywhere and require inexpensive solvents, which results in low extraction costs [8]. In the case of synthetic medications, a pricey organic solvent is necessary, along with tools and production methods, therefore their synthesis requires a high cost with risky manufacturing processes for production. The cost of therapy is lower with plant-based herbal remedies than with synthetic ones because they are made from plants.

Treatment for Various Diseases using Medicinal Plants:

India has a long history of treating various diseases with a range of plants and herbal ingredients. Various sorts of ailments have been treated clinically with some plants, as described in a number of scholarly journals. Plants have a wide range of phytoconstituents, which make them extremely advantageous for important activities like anticancer, antidiabetic, antibacterial, etc. The leaves of several floras have been discovered to have the greatest potential for antidiabetic effect, followed by plant seeds, stems, and rhizomes. Strong anti-diabetic effects are seen in the leaves of *Aloe vera*, *Adhatoda zeylanica*, *Pterocarpus marsupium*, *Annona squamosa*, *Otholobium pubescens*, *Carica papaya*, *Malva verticillata*, *Semen coici* and *Trigonella foenumgraecum* also shows a notable activity in their seeds on antidiabetic action. The augmented plasma insulin level and insulin discharge, decreased serum glucose, decreased blood glucose in STZ, total cholesterol, triacylglycerols, stimulation of insulin synthesis, decreased blood glucose levels and elevated proinsulin to insulin conversion are the mechanisms by which plants act as antidiabetics. The leaves and seeds of plants have more anticancer action than the root, bark, and fruit of the same plant. *Clematis manshrica*, *Catharanthus roseus*, *Ginkgo biloba*, *Solanum nigrum*, *Sylibum marianum* leaves, as well as the seeds of *Medicago scutellata*, *Clausena lansium*, *Vicia faba*, *Psoralea corylifolia*, etc. show promise as therapeutic agents against cancer cells. By acting on cyclindependent kinases, their anticancer mechanisms of action induce cell cycle arrest and death, which suppress the evolution of cancer cells in a dose-dependent way.

The Use of Phytochemicals in Medical Conditions:

Currently, the nutraceuticals sector spends billions of dollars annually on the purchase of meals and supplements for good health. According to health claims made for functional meals and the existence of specific phytochemicals, the corresponding health benefits are supported by science and ethics. They are components of plants and are used in the ethnomedical treatment of many illnesses due to their specific pharmacological and/or physiological effects. Many phytochemicals have important effects on human health, including antioxidants, diuretics, CNS stimulants, apoptosis inducers, antibacterial, antifungal, anti-inflammatory, chemopreventive, hepatoprotective, immuno-modulators, carminative phytochemicals, and several other. [9]. Red pepper and ginger contain the spicy compound capsaicin, which possesses anti-mutagenic and anti-carcinogenic properties. The polyphenolic phytochemicals known as curcuminoids work as an anti-inflammatory and cancer preventative in people [9]. Comparing treated mice to controls, tumor sizes in mice administered dietary soy protein isolate, genistein, or phytochemical concentrations showed decreased by 36 to 47 percent. There are two main isoflavonoids in soy, genistein being one of them (5,7,4'-trihydroxyisoflavone). Genistein exerts anti-proliferative effects on mitogen-stimulated proliferation in human breast cancer cell culture. Breast cancer in rat models created by carcinogen induction exhibits chemopreventive action in soy isoflavonoid conjugates [9].

Treatment of Particular Conditions or Diseases using Phytochemicals:

The utilisation of natural products in traditional medicine worldwide and in ancient times forms the basis for the application of therapeutic drugs in contemporary medicine. Plants were employed by ancient

cultures as a source of not only medicines but also poisons to kill animals, as well as stimulants and hallucinogens for religious rituals. Pharmaceutical companies have always turned to natural plant products as a source for the development of novel medications. In-depth research is being done to identify active compounds with therapeutic qualities in plant sources of herbal medicines high in polyphenols.

Future Prospects for Phytochemicals:

Indigenous populations throughout many continents have traditionally used plants for medicinal purposes, but phytonutrients have just lately come to light as perhaps having widespread efficacy based on scientifically backed nutritional and medical research. The "new" plant-based nutraceuticals could develop into an essential component of food ingredients that prevent disease through diet. The "new" plant-based nutraceuticals could develop into an essential component of food ingredients that prevent disease through diet. The National Institutes of Health did not previously fund studies that emphasised using nutritional methods to treat health issues. It's important to highlight the establishment of Centres for the study of alternative medicine in recent times. Numerous phytonutrients are the subject of careful research for their potential to prevent chronic degenerative diseases. The renewed interest in these chemicals will eventually produce the data on structure-function relationships that are required.

Conclusions:

Native people have traditionally used curative plants to cure many disorders, but only recently have scientific studies confirmed the value of phytonutrients and phytochemicals for the treatment and prevention of various diseases. The "unique" plant-based nutrient-rich food may grow to be important dietary food components that prevent disease. Extensive study is required to completely understand the potential of the various phytochemicals in preventing chronic degenerative illnesses. Because food ingredients are becoming more and more varied, eating designers can now provide solutions that meet the public's stated need for healthy eating. Other considerations for decisive the function of phytochemicals in efficient meals comprise the financial benefit to producers of these nutrients and the identification of research areas needed to generate meals that provide the intended health effects. Plant- and animal-based nutraceuticals have promising futures.

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