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Phytochemicals: Importance, Source and Application

Ulaganathan Arisekar

Department of Fish Quality Assurance and Management

Fisheries College and Research Institute

Thoothukudi – 628 008

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Abstract

Synthetic chemicals have been used as pharmaceuticals to cure most diseases for many years. Traditional plant-based remedies play a big part in healthcare today. Vegetables, fruit, medicinal plants, fragrant plants, and their leaves, petals, and roots all contain phytochemicals, which operate as a natural defense mechanism against disease. Numerous phytochemical types have distinct pharmacological effects, such as protection against cancer, heart disease, diabetes, osteoporosis, harm to DNA, anti-inflammatory, antiallergic, antioxidant, antiviral, antifungal, antibacterial, antispasmodic, chemo preventive, hepatic-protective, hypolipidemic, neuroprotective, and hypotensive effects. This general article detailed to explains the importance of phytochemicals and their classification, types, functions, mechanisms of action of phytochemicals, and their benefits.

INTRODUCTION

Plants are the principal producers of phytochemicals, which are compounds with biological activity. Plants serve as the primary source of many active compounds in the pharmaceutical business. Their pharmacological characteristics make them useful in the treatment of fungal and bacterial infections, as well as degenerative conditions such as diabetes and cancer that progress over time. Pharmacologically, it has specific effects on human health, including anti-inflammatory properties, antiallergic, antioxidant compounds, antimicrobial, antifungal, antispasmodic, chemo preventive, hepatic-protective, hypolipidemic, neuroprotective, hypotensive, antiaging, bone density loss, DNA damage, cancer, and heart diseases; it also induces apoptosis, diuretics, CNS stimulants, analgesics, and protects against UVB-induced carcinogenesis. Glucosinolates, flavonoids, polyphenols, is flavonoids, anthocyanidins, phytosterols, terpenoids, carotenoids, limonoids, and phytoestrogens are examples of phytochemicals. Taxol is a naturally occurring

Substance from the taxoid family that is also well-known for its anticancer impact against prostate, lung, and breast cancers; it also has a positive effect on Kaposi's sarcoma. Phytochemicals are one of the most significant secondary metabolites. There is a continuous association between frequent eating of whole-grain wheat and a

reduced likelihood of chronic illness, according to epidemiological studies. Most of these health benefits have been linked to barley fiber, namely the glucan found in whole-grain barley. Whole-grain barley contains a variety of phytochemicals, including tools, phytosterols, lignans, phenolic acids, and folate. Whole-grain barley also has phytochemicals, including tools, phytosterols, lignans, flavonoids, and phenolic acids. Consequently, barley's health benefits may be mostly attributed to its high phytochemical concentration. Wheat phytochemicals are among their potential uses in the treatment and prevention of diabetes, heart problems, obesity, and other food-related disorders (Mendoza and Silva, 2018).

IMPORTANCE OF PHYTOCHEMICALS

Mainly, nutrition has focused on reducing the consumption of total fat, saturated fat, and cholesterol to avoid cardiovascular disease. The food industry quickly responded by producing low-fat products, some of which have been advantageous due to increased concentrations of refined carbs, particularly low-fat dairy products. A range of foods, including certain fatty acids, along with other nutrients found in vegetables, whole grains, fruits, and nuts, can reduce coronary heart disease (CHD), according to current research. Although the benefits of omega-3 and monounsaturated fats have been shown, the current emphasis is on reducing trans and saturated fats. Consuming vegetables, fruits, and whole grain foods has been associated in several recent studies with reducing CHD. Their fiber, vitamin, mineral, and phytochemical content have been linked to this. The evidence for the preventive effects of flavonoids, phytoestrogens, vitamin B6, vitamin B12, folate, and other nutrients is growing. The usage of a variety of minimally processed foods, along with a renewed emphasis on a comprehensive dietary pattern, is now required in new recommendations to prevent heart disease (Tucker, 2004). Bioactive substances known as phytochemicals, which are found in the nexus of the food and pharmaceutical sectors, are essential to nutraceuticals because they support or advance health. These substances can include processed foods, alcoholic drinks, herbal goods, separated nutrients, dietary supplements, and particular diets. They can also include designer foods that have been genetically altered. Among the phytochemicals are phytoestrogens, terpenoids, polyphenols, glucosinolates, and other phytochemical. They may provide medical advantages, like the prevention and/or treatment of diseases and physical deviations, and they have an important impact on the healthcare system. Most foods, including whole grains, beans, vegetables, fruits, and plants, have phytochemicals that are significant for nutraceuticals. These phytochemicals have great therapeutic potential to treat an array of illnesses, either by themselves or in combination. The related beneficial effects of functional foods, claims about health, and the presence of certain phytochemicals are supported by both science and morality.

TYPES OF PHYTOCHEMICALS

Koche et al. (2016) have reported that alkaloids, phenolic compounds, terpenoids, and tannins are the main families of phytochemicals that have some pharmacological properties. They can also be used to prevent illness. There are several chemical classes into which these active agents are separated, and each has a range of potencies. Several of those phytochemicals have been shown to have several functions.

SOURCES OF PHYTOCHEMICALS

Citrus fruits have been connected to several therapeutic properties, including anticancer, antiviral, antitumor, and anti-inflammatory actions, impacts on capillary fragility, and the potential to inhibit platelet aggregation. Therapeutic values for cardiovascular illnesses and age-related macular degeneration have recently been revealed. And also, the citrus fruits, which are responsible for their significant health advantages. These phytonutrients have the potential to function as immune system stimulants, antimicrobial agents, hepatic-protecting enzymes, and shield DNA from oxidative damage. Phytonutrients and vitamins may be responsible for citrus species' anti-inflammatory, anticancer, and antioxidant properties. Numerous uses for citrus species exist in herbal medicine, and in Nigeria, they are consumed as fruits (Okwu, 2008). The minerals and bioactive phytochemicals found in medicinal plants are abundant. To avoid chronic diseases including diabetes, cancer, and heart disease, phytochemicals are crucial. The primary groups of phytochemicals that can prevent illness include antioxidants, dietary fiber, agents that promote immunity, detoxifying agents, anticancer agents, and neuropharmacological agents. These phytochemicals have a variety of uses. More thorough research is still needed to evaluate the phytochemical content of Indian medicinal plants and determine whether they can prevent illness (Saxena et al., 2013).

APPLICATIONS OF PHYTOCHEMICALS

This list includes phenolics, terpenoids, alkaloids, flavonoids, pigments, steroids, and essential oils, just a few of the many plant-derived substances that are frequently present in diets rich in fruits, vegetables, beans, and grains. The traditional legacy of many nations has strong ties between plant treatments and the preservation of good health. Chakraborty and Hancz (2011) studied that despite the potential benefits to health and performance that have been demonstrated in a range of terrestrial species, phytochemicals have not been extensively researched about their use in fish farming. Fish farming is under pressure to use fewer artificial antibiotics and chemotherapeutics because chemicals remain in food, and the emergence of resistance to antibiotics among human illnesses poses a risk to human health. Consequently, efforts are being undertaken to replace synthetic medications for the establishment of immune system reactions and resistance to illnesses in fish by using plants, extracts of plants, or naturally found plant components. With no harmful effects on the environment or human health, the phytochemicals in herbs have the potential to boost the immune system's natural defenses and have antibacterial qualities that might be very helpful in fish farming. The vast majority of phytochemicals are redox-active, antioxidant-containing substances that may improve the general physiological health of fish. In particular, the use of Chinese and Indian medicines as antibiotics against Aeromonas hydrophila and as immunostimulants in several finfish taxa during culture is highlighted. Chakraborty et al. (2014) have reported that plants contain a vast range of chemical compounds, and many of them have been demonstrated to have favorable impacts on fish appetite, development, and immunological function in several ways. In addition to having antibacterial and redox-active characteristics, herbal phytochemicals may fortify fish's innate immune systems and enhance their general

physiological condition. The endocrine modulator effect of phytochemicals, which may be used in aquaculture to produce both table fish and the expanding market for decorative fish, is another major worry about them. Numerous mechanisms have been proposed to explain the reproduction-related hormonal imbalances in fish populations triggered by phytochemicals. These mechanisms include disturbance of thyroid and growth hormone, actions that affect the hypothalamus-pituitary-gonad axis, direct effects on steroid receptors, as well as impacts on steroid synthesizing, distribution, and excretion.

CONCLUSION

Botanical substances are known as phytochemicals. It has specific pharmacological effects on human health, such as anti-inflammatory, antiallergic, antioxidant, antifungal, antibacterial, antispasmodic, chemo preventive, hepatoprotective, hypolipidemic, neuroprotective, low blood pressure, antiaging, diabetes, osteoporosis, cancer, and heart disease. It is also active against quite a few other diseases. It provides additional advantages for human health in the end.

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