Phytochemistry and Functional Food: The Needs of Healthy Life

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Abstract

Getting nutrients for the physical activities, growth, and maintenance of body from food is essential for all of the living organisms. Human being continues to increase its knowledge and understanding about the food and their role in maintaining and optimizing health. It is well-established now that intake of nutrients in appropriate quantity is essential for a healthy life. Certain nutrient becomes essential to be taken up under a particular deýciency condition or for a speciýc purpose/gain. However, for the beneýts to be gained/validated or the claims to be made, a strong and reliable regulatory framework is required based on the scientiýc evidence. For the functional food to deliver its potential health beneýts, the product must contain the ingredients in the quantity and form described in the health statements and claims. With the scientiýc and technological advancements in the ýelds of health and nutrition, increasingly more focus is directed toward personalized nutrition or nutrigenomics. Although increasing the availability of healthy foods has become a necessity in today's world, the regulatory framework is needed to protect consumersů right. Making the consumers aware of the health beneýts of functional foods available in the market is critically important.

Ke ords: Nutrigenomics; Phytochemistry; Balanced diets; Bioactive compounds; Flavonoids

Introduction

Food is inevitable for living organisms, and humankind has always been interested in search and research on food materials. Ever since the domestication of plants, considerable progress has been made in agriculture due to the behavioral/social changes in human being from food gathering to farming [1]. Domestication followed by the selection of plants with desirable traits, breeding varieties for higher yield, tolerance to abiotic & biotic stresses, better quality and nutrition, and the technological advancements have enabled a signi cant increase in food grain production. Global population is expected to reach 9 billion by 2050. is increase (2 to 3 billion people) in global population over the next 35 years would require increasing the food production by 70% [2]. To feed the ever-growing population, we need to produce more food and feed from less per capita arable land, water, and other natural resources availability of which is shrinking day-by-day. Providing ample food and feed to the global populations is only the preliminary challenge; the major challenges would be to produce these in a safe and sustainable manner under the increasingly unfavorable environmental conditions [3]. e global climate change is resulting in adverse climatic conditions which not only a ect the productivity of crop and animal husbandry but the quality of the produces is also a ected adversely. In the present century, we must not only bother about producing su cient food to ll the stomach of burgeoning global population but also to produce nutritious foods to provide a healthy diet to the population. is is why phytochemistry and functional foods have become important areas of research and development.

Needs of the Health Life

Food is the basic fuel of life. Nutritious/balanced diets are essential for the maintenance of the healthy body. Basic food groups like whole grains, fresh vegetables and fruits, dairy and other animal products can provide the essential nutrients (carbohydrates, proteins, fat, vitamins, minerals, bers etc.) required for the healthy life. However, it is essential to take these basic nutrients in the balanced and bioavailable forms [4]. As the natural laws, we must remember here also that either the de ciency or the excess of everything is bad. For example, cholesterol is an essentially present component of our blood-stream and in every cell of our body where it helps in the working of cell membranes, producing hormones, vitamin D, and bile acids. It also helps in keeping our memories and is vital for neurological functions. But many of us are also aware that a higher-level of cholesterol in the blood can be harmful to healthy life. erefore, it is essential to balance the intake of nutrients in our diet. is is where balanced diet comes in the picture. A balanced diet is nothing but a diet containing all of the essential nutrients needed for the growth, development, maintenance, and functions of our body in appropriate quantities. is essentially means that the balanced diet is not only comprised of the right food items but also in the proper amounts. Biochemical studies indicate that in addition to the balanced diet, physical activity is also important for suitably metabolizing the nutrients, and reducing the risks of lifestyle problems like obesity, diabetes, heart disease etc. [5]. It also stimulates mental wellness by producing brain chemicals (noradrenaline, serotonin, dopamine etc.) involved in regulating mood, sleep, appetite and physical activities.

us, biochemistry is important to understand the needs of healthy life as well as to successfully manage it. As a larger part of our foods (particularly vegetarian diet) comes from di erent parts of the plants, we need to study chemical properties of the compounds produced by plants. ese would not only help in the formulation of a balanced diet, but also in other areas like their usage in medicines, industries etc.

Ph tochemistr : Characteri ation of plant products

e compounds produced by the living organisms are studied under a specialized branch of chemistry known as biochemistry. ough plants produce a huge number of compounds (phytochemicals), phytochemistry focuses mainly on study of the phytochemicals relevant

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for nutrition, protection, medical treatment, and industry. e major group of phytochemicals currently being studied under this branch of science is the secondary metabolites of the plant. Phytochemistry not only deals with biosynthesis, structure, and functions of secondary metabolic compounds found in plants but also related their functions in animal/human bodies. e phytochemicals are synthesized by plants mostly for protecting themselves from invaders, particularly insect pests and diseases. Plants being sessile organisms, they are frequently exposed to a variety of environmental stresses [6]. Since the plants cannot move away to escape from unfavorable environmental factors, they have developed the capability to produce a variety of protective compounds against the stressful conditions they face in their niche [7]. Many a time, these phytochemicals have been proved to be equally protective for animal bodies, may be under a similar or di erent environmental stress like radiations [8]. Plants contain several active phytochemicals bene cial for human biology, and in many cases, they have health bene ts for human beings. Broadly, these phytochemicals can be grouped into four major chemical classes namely alkaloids, glycosides, polyphenols, and terpenes. In addition to these, various phytochemicals particularly avonoids, stilbenoids and essential oils

Conclusion

e Scienti c community continues to understand the potential of foods and their role in maintaining and optimizing health. However, the strong and reliable body of scienti c research is needed to con rm the health bene ts of a particular food/component, and e ective and e cient regulatory network would be required for the functional foods to be produced and delivered to the public for potential health bene ts.

ere are opportunities for research in nutritional science to establish a convincing relationship between a food or a food component and an improved state of health, well-being or reducing the risk of disease. is presents a great challenge to the scientists in enabling the consumers to adopt functional food now and nutrigenomics in the future. Communication with the potential consumers about the health bene ts is also critically important so that they have the knowledge to make informed choices of the foods they eat, enjoy, and those available in the market which can be used for speci c purposes.

e views expressed herein are those of the authors only, and these may not necessarily be the views of the institution/organization the authors are associated with.

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