

ADVANCE ANALYSIS OF NUTRACEUTICAL**Rishabh Shukla*, Dr. Rohit Mohan**

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ABSTRACT

This article reviews the many nutraceuticals that can be found in natural matrices and the analytical methods that were employed to detect and/or measure them, with a focus on the years January 2005-May 2010. The study discusses the analytical methods used for their determination (separation, spectroscopic, hyphenated techniques, etc.) and spectroscopic evaluation of various nutraceuticals identified in natural matrices and the analytical methods employed to identify and/or quantify them, with a focus on the years January 2005-May 2010. Various nutraceutical families (lipids, vitamins, proteins, glycosides, phenolic compounds, etc.) are covered in the book, along with the analytical methods used to determine them (separation, spectroscopic, hyphenated techniques, etc.). Together with information on the natural matrices in which the various families of nutraceuticals are found (e.g., fruits, vegetables, plants, microalgae, cereals, milk, etc.), there is also information regarding the purported health-promoting properties of these products.

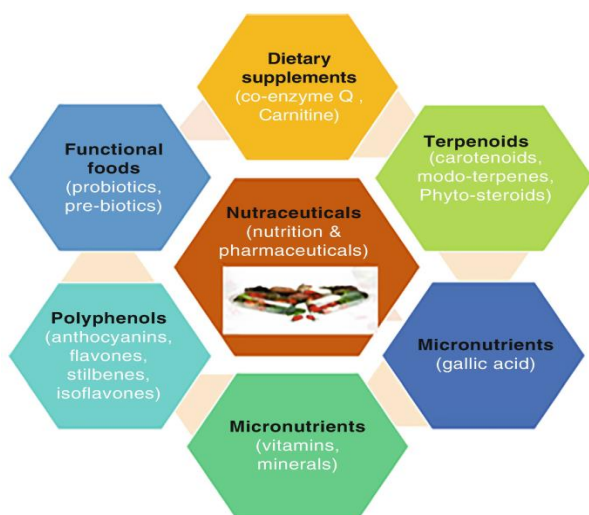
INTRODUCTION

Natural products, primarily derived from plants, have long served as a significant source of preventive agents for the treatment and prevention of diseases in both humans and animals. Hippocrates (460–370 BC) famously proclaimed, “Let food be your medicine and medicine be your food.” Today, the link between food and pharmaceuticals is becoming increasingly closer. The term nutraceutical emerged two decades ago to illustrate the connection between nutrition and pharmaceuticals, both of which are essential for human health. Over the past twenty years, numerous research articles have focused on so-called “functional foods” and “nutraceuticals. The inclusion of functional additives in food items has shown encouraging results from research, which will help consumer health and offer value for producers.^[1] which displays the exponential growth of research publications pertaining to nutraceuticals and functional foods over the past 20 years, demonstrates the growing interest in this topic. It's also noteworthy to note that over 150 review works about functional foods and nutraceuticals were published throughout that time.^[2] Some of them concentrate on the advantageous qualities of a certain natural matrix, such as spices, tea, or sesame, while other texts focus on certain natural substances,

such as phytochemicals. While some studies focused on certain natural substances, such as phytochemicals, proteins and peptides, or lipids, other studies demonstrated the advantages of nutraceuticals in preventing a number of illnesses, including degenerative joint diseases and atherosclerosis. It should be noted that, as far as we are aware, no revised work has been written that summarizes and discusses the sophisticated analytical methods utilized to evaluate nutraceuticals.^[3]

Nutraceutical

Nutraceuticals are foods or dietary ingredients that offer health advantages over and above basic nourishment; they are frequently used to cure or prevent illnesses. Dietary supplements (such as vitamins, minerals, and herbs) and functional foods (such as probiotics and foods supplemented with omega-3) fall under this category. They come from food sources and provide a variety of benefits, including boosting immunity, reducing blood pressure, and functioning as antioxidants.^[4]



MICRONUTRIENTS

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Lipids

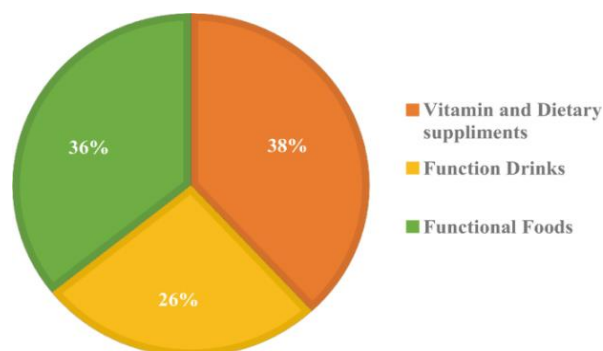
Fats, waxes, sterols, fat-soluble vitamins (including vitamins A, D, E, and K), monoglycerides, diglycerides, phospholipids, carotenoids, and other substances are all considered lipids. Lipids also include sterol-containing metabolites like cholesterol, as well as molecules like fatty acids and their derivatives (such as tri-, di-, and monoglycerides and phospholipids). Lipids' primary biological roles include energy storage and cell structural components.^[6]

Amino acids, peptides, and proteins – Consuming certain proteins, peptides, and/or amino acids can have a number of positive effects on human health. They may have antibacterial, antioxidant, immunostimulating, antithrombotic, and anti-inflammatory properties;

among other beneficial effects on the body, they may be used to prevent and cure diabetes, hepatitis, and hypertension. These substances are extremely important because of all these health-promoting benefits.^[7]

Glycosides, carbohydrates, and associated substances

- In living things, carbohydrates provide a variety of vital functions. Therefore, monosaccharides are the primary energy source for metabolism, although polysaccharides can function as structural elements and store energy.^[8] Additionally, these substances have been connected to additional positive health outcomes, such as their prebiotic effect or less well-known antioxidant or anti-inflammatory properties.^[9]



LIMITATIONS OF NUTRACEUTICAL

➤ **Lack of Standardization** Numerous nutraceuticals come from natural sources, and their composition varies depending on factors like soil, climate, harvesting, processing, etc. This results in.

- Challenging to maintain consistent quality control.
- Analytical findings are difficult to generalize between brands or batches.^[10]

➤ **Bioactive Compounds' Complexity**

- Numerous active ingredients that work together are frequently found in nutraceuticals.
- Compounds can be isolated individually using sophisticated analysis equipment.
 - However, synergistic effects could be overlooked or misunderstood.^[11]

➤ **Insufficient Clinical Data**

- Even if helpful substances are found by advanced analysis.
- Many lack thorough clinical trials demonstrating efficacy and safety.
- Human reactions differ depending on factors such gut microbiota, nutrition, and heredity.^[12]

➤ **Regulatory Difficulties**

- In contrast to medications.
- Strict permission may not be necessary for nutraceuticals.
- Testing regulations differ between nations.
- Causes uneven quality and possible safety issues.^[13]

- Expensive and Technical Knowledge
 - .Advanced analytical methods (such as metabolomics, NMR, and LC-MS/MS).
 - .need pricey instruments.
 - .Require highly skilled workers.
 - .Small manufacturers might not be able to access it.^[14]
- The Challenge of Determining Bioavailability.
 - . Finding nutrients in a sample does not guarantee that the body uses or absorbs them effectively.
 - .Digestion, metabolism, and interactions with other nutrients all affect bioavailability.
 - .Advanced analysis might not accurately represent physiological consequences.^[15]
- Conclusions and upcoming developments
 - In this work, we have provided an overview of nutraceuticals from January 2005 to May 2010. We have covered the various bioactive compounds (lipids, vitamins, proteins, glycosides, phenolic compounds, etc.), their purported health benefits, the primary analytical methods used to analyze them, and the natural matrices in which they are found. The amount of research papers (>200) published on this issue in the literature demonstrates the topic's scientific interest.

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